

Judgment Skills in Health Literacy: Measurement and Role in Effective Asthma Patient Self-management

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SUMMARY

In recent years, health communication has focused attention towards the study of health literacy due to its recognized influence as a strong determinant of health (WHO, 2013). Health literacy is generally understood as the individual's abilities to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Ratzan & Parker, 2000). Over time its definition has developed to include more advanced abilities that go beyond the functional skills of reading, writing, and numeracy, as was the case during its early conceptualization. Despite this, the measurement of health literacy has not advanced as much as its conceptualization, and to date, the most commonly used tools still focus on the measurement of functional skills.

The Health Empowerment Model (Schulz & Nakamoto, 2013) has proposed a multilevel conceptualization of health literacy composed of declarative knowledge, procedural knowledge, and judgment skills. This last element refers to individuals' abilities to identify the necessary means to attain good health as one of their goals (Rubinelli et al., 2009). Although, judgment skills have been explored and used in other ambits (Rief et al., 2013), the potential of these skills to understand more in-depth health behaviors has not yet been studied in the health literacy context. Consequently, there are no available tools to measure skills in this area. The present work aimed to contribute to the field of health literacy by developing an instrument to measure judgment skills, and to explore the role of this element in the context of asthma self-management.

This dissertation is a collection of three empirical papers describing three interrelated studies. In addition, an introductory chapter reviews the state of the art of the health literacy field and addresses how judgment skills come into play. Moreover, a general conclusion reports the contribution of this work to the field of health literacy, and states the direction for future research concerning judgment skills, and the role of these skills on the self-management of chronic diseases.

The first paper describes the development of a scenario-based tool in the context of asthma self-management. The tool was constructed in different stages that included a revision of scientific literature on asthma self-management, and several consultations with pulmonologists and asthma patients. Moreover, a three-round Delphi study composed of a panel of twelve experts in the field of lung diseases was conducted. This panel helped to validate the content of the tool and to create a ranking score for the responses from a medical perspective. This process resulted in a scenario-based judgment skills tool composed of nineteen scenarios with four response options each.

The second paper describes a pilot study. This study used the newly developed judgment skill tool with a sample of 80 asthma patients to explore constructive and destructive self-management practices. Patients were classified according to their level of judgment skills, either on the High or Low judgment groups. Significant associations were found between self-management practices and the level of these skills, including compliance with the use of asthma medicines and consultations with doctors when asthma-related problems arouse.

The third paper describes the use of the Health Empowerment Model to explore the influence of the health literacy components, including judgment skills and psychological empowerment on asthma self-management practices. This study was carried out with an independent sample of 236 asthma patients. Findings revealed that judgment skills and empowerment have a significant and positive impact on the use of asthma medicines, appropriate doctor consultation, and trigger controls. However, other elements of health literacy that address communicative and critical skills as a result of health information use appeared to have significant negative effects on self-management practices. Furthermore, results from this study endorse the use of the Health Empowerment Model to explain health-related behaviors.

In summary, the results of these three studies support the use of judgment skills as an integral part of the conceptualization of health literacy. These findings al-

so contribute to broaden the range of measurement tools available to assess a more advanced health literacy dimension within the context of chronic diseases.

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CHAPTER I

General introduction

Introduction

Health literacy: An important determinant of health and a contested concept

Modern societies are exposed to an overwhelming amount of health-related information concerning health behaviors, nutrition, medication, and treatments, among other subjects. These have been created and distributed by numerous sources including food and drug industries, governments, and health insurance entities (IEPH, 2008). This information environment requires individuals to have the skills to access, understand, judge and use health information in ways that allow them to make informed decisions to attain good health (WHO, 2013). Such skills are commonly known as health literacy.

Four decades have passed since the term “health literacy” was first introduced (Simonds, 1974). In the early years, it referred to the individual’s basic skills of reading, writing and numeracy that allowed patients to read and comprehend medication labels, appointment slips, and other essential health-related material (AMA Ad Hoc Committee, 1999). However, due to the growing complexity of variables within the health care context, this initial definition fell short, and new conceptualizations were proposed (Ishikawa & Kiuchi, 2010; Nutbeam, 2000).

There are multiple skills and applications that are increasingly identified as necessary for an individual to be considered health literate. Thus, the conceptualization of what health literacy comprises is still evolving (Berkman et al., 2010). A commonly used definition, proposed by the Institute of Medicine (Nielsen-Bohlman et al., 2004), conceives health literacy as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions” (Ratzan & Parker, 2000: p.ix). Other skills frequently included in the definition integrate communicative skills (effective speaking, listening, and writing), the ability to use technology (particularly the web), and cognitive ability, networking, social skills, and motivation (Berkman et al., 2010).

Despite the dynamic characteristics of the conceptualization of health literacy, it is consensually recognized as a multilevel construct commonly distinguished by three levels: (1) *basic/functional literacy*: this comprises reading, writing and numeracy skills that allow individuals to function effectively in everyday situations; (2) *communicative/interactive literacy*: this comprises more advanced cognitive and literacy skills to extract information and derive meaning from different forms of communication, and to apply new information to changing circumstances; and (3) *critical literacy*: this comprises more advanced cognitive skills necessary to critically analyze and use information to exert greater control over life events that are implicated in personal health (Nutbeam, 2000).

In recent years, health literacy has been recognized worldwide as a strong determinant of health, independent of the level of education, income, and employment status (WHO, 2013). A study looking at all-cause mortality and cardiovascular death among elderly persons concluded that health literacy was a more powerful variable than education when examining the association between socioeconomic status and health (Baker et al., 2007). Furthermore, several authors have underscored the limitations of using educational attainment as an indicator of differences in health outcomes, or to evaluate the effectiveness of health related interventions, as individuals with similar educational attainment can differ substantially in their reading and mathematical skills (Kutner et al., 2007; Kirsch et al., 1993).

Concerning health behaviors and outcomes, limited health literacy has been associated with increased morbidity (Baker et al., 2007; Baker et al., 2002; Arnold et al., 2001; Kalichman et al., 2000a; Kalichman et al., 2000b; Williams et al., 1998a; Williams et al., 1998b), frequent hospitalizations (Baker et al., 2002), increased use of emergency departments (Nielsen-Bohlman et al., 2004; Baker et al., 2002), delayed use of medical aid (Bennett et al., 1998), poorer medication compliance (Lasater, 2003; Win et al., 2003), more frequent medication errors, poorer self-management of chronic diseases (Schillinger et al., 2002; Kalichman et al., 2000a; Williams et al., 1998a; Williams et al., 1998b), riskier health choices, less frequent

use of preventive services and poorer engagement in health promotion behaviors (Scott et al., 2002). Furthermore, inadequate health literacy has been also associated with insufficient ability to communicate with health care professionals and to participate in decision making (Kim et al., 2001).

Likewise, limited health literacy imposes an economic burden on individuals, healthcare systems, and societies as a whole (WHO, 2013, D'Eath et al., 2012,). The WHO health literacy report noted that limited health literacy cost more than US\$ 8 billion in Canada in 2009, an estimated 3-5% of the total health care budget of the country. In 1998, the National Academy on an Aging Society estimated that the additional health care cost as a result of limited health literacy were about US\$ 73 billion per year. Findings showed that the primary source for higher health-care expenditures for low health literate individuals were longer hospitals stays (IEPH, 2008). Data from Switzerland suggest that 1.5 billion Swiss francs are spent on health care due to limited health literacy (Spycher, 2006). Although there is yet to be extensive data for European health systems, the WHO report (2013) stated that results similar to those found in the US would be expected in European welfare states that provide nearly universal health access to their citizens (WHO, 2013).

Frequently, low literate individuals are members of racial minorities, and other disadvantaged groups including individuals with low educational attainment, the elderly, and immigrants (D'Eath et al., 2012; Beers et al., 2003; Gazmararian et al., 1999). This makes these groups more vulnerable to risk factors and less likely to engage in prevention and screening behaviors, which in turns results in poorer health status, and maintains pre-existing inequalities (Diviani & Viswanath, 2011).

Several countries have realized the potential of improving the health of their population, reduce health care costs, and alleviate inequalities by assessing and tackling the health literacy levels of their populations. This issue is receiving increased research attention in many countries. Canada, the United States of America, the United Kingdom and Ireland have initiated and completed surveys of health literacy at the population level (WHO, 2013). Moreover, the first international survey has re-

cently taken place in eight European countries (Austria, Bulgaria, Germany resp. North Rhine-Westphalia, Greece, Ireland, the Netherlands, Poland and Spain) as part of the European Health Literacy Survey (HLS-EU, 2012).

Health literacy and its measurement

The field of health literacy has been hindered by the lack of progress made in the development of measurement tools (Berkman et al., 2010). Generally, health literacy tools assess reading, comprehension, word recognition, and numeracy skills (Rootman, & Gordon-EI-Bihbety, 2008), tackling exclusively the level of *functional literacy*. However, these tools are unable to measure more advanced dimensions of health literacy (Nielsen-Bohlman et al., 2004).

The most common tools used to measure health literacy are the Rapid Estimate of Adult Literacy in Medicine (REALM) (Davis et al., 1993), and the Test of Functional Health Literacy in Adults (TOFHLA) (Parker et al., 1995). The first assesses the individual's ability to recognize and pronounce words (i.e. read a list of 66 common medical words aloud), and the second is a 67-item assessment that tests the individual's ability to read and comprehend text and perform computations involving health-related tasks (i.e. reading prescription labels and calculating dosing intervals of medicines). Both tools have been widely used in different populations, translated into different languages, and readapted into shorter versions, such as the S-TOFHLA (Baker et al., 1999). The skills measured by these tools more closely measure skills included in the earlier conceptualization of health literacy, and only partially measure newer conceptualizations. In fact, these tools are unable to measure the main elements of health literacy such as understanding, motivation, and the ability of individuals to access or use information concerning health and health care (Easton et al., 2010; IOM, 2009; Rootman, & Gordon-EI-Bihbety, 2008; Berkman et al., 2004). Other health literacy tools include the Brief Health Literacy Screen (BHLS) (Chew et al., 2008). This instrument assesses individuals' abilities to read, interpret, and understand health material. Other measurement tools include the Newest Vital Sign

(NVS) based on a nutrition label from an ice cream container (Weiss et al., 2005), and a tool developed by Ishikawa et al., (2008) addressing the three health literacy dimensions proposed by Nutbeam (2000) including *functional*, *communicative*, and *critical* health literacy. These tools have attempted to overcome some of the former measurement limitations. However, findings from studies using these tools are inconclusive regarding their capacity to measure more advanced health literacy dimensions (Van der Vaart et al., 2012; Wallace et al., 2006). Another tool such as the one developed by The National Assessment of Adult Literacy (NAAL) is a more comprehensive tool; however, this is not publically available and cannot be used in research and interventions (Berkman et al., 2010).

A literature review reporting on the state of the art of health literacy tools and their psychometric properties, found 19 instruments published between 1990 and 2008 (Jordan et al., 2010) with the majority of the studies conducted in North America and in clinical settings (Jordan et al., 2010). Furthermore, most of the health literacy instruments served as screening tests, whose main purpose was to divide individuals' health literacy into categories, such as inappropriate vs. appropriate. The major limitation of these tools is their inability to discern information related to the areas in which the individual is failing (IOM, 2009). The authors of this review concluded that the nature of the content varied significantly across these health literacy tools, thereby making it difficult to interpret and compare studies (Jordan et al., 2010).

The IOM (Nielsen-Bohlman et al., 2004) has underscored the need to make advances in the field of health literacy by developing new tools that go beyond existing measurements of functional skills, so that they are able to assess more advanced skills. This need has been addressed and supported by several authors (Chinn, 2011; Nutbeam, 2000).

Judgment skills in the context of health literacy

The idea that health literacy should include a more robust dimension that reflects the individual's ability to make a self-assessment (Rubinelli et al., 2009;

Schulz & Nakamoto, 2006), suggests a perspective that goes beyond the individual's functional skills and points towards an individual's judgment in the health context.

Individual self-examination (i.e. proposed as a form of *phronesis* or practical intelligence) refers, in this context, to the individual's ability to determine goals related to the attainment of health and to the identification of the necessary means to reach these goals (Rubinelli et al., 2009). Therefore, self-examination should entail four elements as primary means to reach these goals in the health context:

1. Individuals should be able to recognize their own health competencies and their limits. Knowing when to turn to healthcare professionals for help and advice (e.g. *the need to see the doctor after three days of high fever*).
2. Individuals should be able to appraise health information, and discern objective from subjective health information (e.g. *scientific data has demonstrated the health-benefits of vaccination vs. forums of laypeople claiming the contrary*).
3. Individuals should be able to recognize their own knowledge gaps and try to fill them by asking appropriate questions (e.g. *asking the doctor questions regarding the duration, benefits and side effects of a particular treatment*).
4. Individuals should be able to recognize possible barriers that could prevent them from engaging in appropriate health behaviors, and thus, have the ability to recognize when to ask for professional help (e.g. *a person who consults his practitioner on available methods to quit smoking*).

Self-examination as a component of health literacy is an important consideration because, as noted by various authors, adequate health literacy alone does not necessarily translate into appropriate health behaviors (Rubinelli et al., 2009); neither do informed patients without goals automatically engage in lifestyle changes (Bodenheimer et al., 2002). Therefore, it is important to explore whether individuals have as

one of their goals the attainment of good health and whether they realize the primary means to achieve this goal using the four recommended pathways.

Phronesis has received a lot of attention across several disciplines, including philosophical and communication theories, bioethics as well as practical domains (Rief et al., 2013). In the domain of nurses and clinicians, *phronesis* has been employed extensively under the term *clinical judgment*, and has been used as a reflection of the practice, and as an educational tool to develop and enhance knowledge and skills of healthcare professionals (Centor, 2009; Montgomery, 2009, 2006). Within this context, *phronesis* has also served to designate practices employed by healthcare providers to engage patients in their own care (James et al., 2010; Connor, 2004).

Phronesis has also been used within the context of self-management of diseases to explore patients' abilities in decision-making and the activation of healthy behaviors (Rief et al., 2013). A study using an online intervention to promote healthy eating, physical activity, and weight loss concluded that the translation of the *phronesis* concept, drawn from communication theory into the health context is valuable, due to its potential to enhance doctor-patient communication, and to enhance patients' skills required to make active transitions into healthier lifestyles (Rief et al., 2013).

In summary, individuals' self-examination entails *phronesis*. This has been recognized as a critical element in different contexts, including patient self-management (Rief et al., 2013) and health literacy (Rubinelli et al., 2009; Schulz & Nakamoto, 2006). This allowed that self-examination was later incorporated into the Health Empowerment Model (HEM) being defined as *judgment skills* (Schulz & Nakamoto, 2013).

The Health Empowerment Model

The Health Empowerment Model (HEM) was proposed to understand health behavior in light of two constructs, health literacy and empowerment. In this conceptualization, health literacy entails three elements, known as *declarative knowledge*

(*know-that*), *procedural knowledge (know-how)*, and *judgment skills*; while empowerment entails four elements: *meaning*, *competence*, *self-determination* and *impact* (Schulz & Nakamoto, 2013) (Figure 1). Typically, within the public health sector, health literacy and empowerment have been considered influential factors in individuals' health behaviors. However, both elements have often been merged into one (i.e. one element implying the other), or they have been used separated (Schulz & Nakamoto, 2013, 2011). The HEM seeks to reconcile these two constructs, considering both as independent and complementary to each other (Schulz & Nakamoto, 2011).

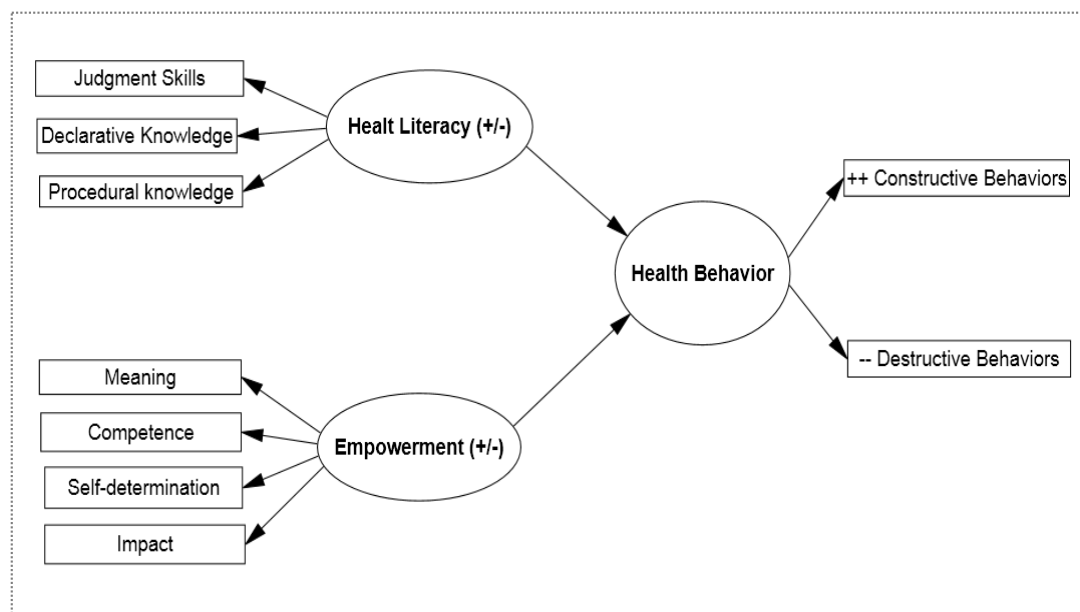


Figure 1. Health Empowerment Model (Schulz & Nakamoto, 2013).

Declarative and procedural knowledge are concepts commonly found within the learning context, which focus on meta-cognition. Declarative knowledge refers to knowledge of information (e.g. oranges are rich in vitamin C), while procedural knowledge refers to the use of knowledge in the performance of a task. The latter is acquired by doing (e.g. applying the steps to use an asthma inhaler). Judgment skills, on the other hand, refer to individuals' abilities to identify the necessary means to attain good health as one of their goals (Rubinelli et al., 2009). (e.g. a person who suf-

fers from asthma and enjoys playing sports discusses with his or her doctor the therapeutic options that will allow him or her to adapt his lifestyle in order to continue playing sports and not risk injury to his or her health).

Psychological empowerment (PE) refers to the individual's cognitive state characterized by a sense of perceived control, competence, and goal internalization (Oladipo, 2009). Empowered individuals feel responsible for their own health, and participants in the decision-making processes, thereby reducing dependency on healthcare providers (Wallerstein, 2006).

The psychological empowerment construct proposed for the HEM was adapted from the organizational sciences where it is defined as an *intrinsic motivational process* in workers (Thomas, & Velthouse, 1990) that reflects an active (rather than a passive), orientation to a work role (Spreitzer, 1995). This perspective used in the health context, particularly regarding the self-management of chronic diseases, could play a potential role in understanding health behavior of patients by identifying their *intrinsic motivation* to care about their health condition, and to explore their self-perception of competencies regarding self-management tasks.

The four volitional elements composing the psychological empowerment construct, impact, competence, meaning, and self-determination have been widely studied within the psychological field. *Impact* refers to the individual's perception of the influence of his or her behavior in achieving a task. This element has been associated with behaviors when facing difficult situations (Ashforth, 1990). The general notion of perceived impact has been studied under a variety of labels, including locus of control (Rotter, 1966). This is meant to explain the degree to which people believe that they, rather than external factors, determine what happens in their lives (Rotter, 1966). *Competence* refers to the degree to which individuals perceive themselves able to perform tasks skillfully. Several studies have reported that competence results in efforts and perseverance in challenging situations (Gecas, 1989), coping (Ozer & Bandura, 1990), and high performance (Locke et al., 1984). In the clinical psychological literature, this element has been studied by Bandura (1977) as self-efficacy.

Bandura (1977) noticed that low self-efficacy leads people to avoid situations that require relevant skills. This avoidance behavior tends to prevent individuals from facing fears, building competencies, and improving perceived competence (Thomas & Velthouse, 1990). *Meaning* refers to the value given by the individual to the objective of the task. Studies reporting high perceptions of this factor correlate with high commitment and involvement (Kanter, 1983; Thomas & Velthouse, 1990), whereas low degrees of meaning result in apathy and detachment feelings (Thomas & Velthouse, 1990). *Self-determination* refers to the individual's autonomy in making choices (Ryan & Deci, 2000). One study reported that self-determination resulted in learning, interest in activity, and flexibility in the face of adversity (Ryan & Deci, 2000). This produced greater flexibility and initiative. In contrast, the sense that a person is controlled by external factors leads to tension and decreased self-esteem (Ryan & Deci, 2000).

According to a literature review conducted by Wallerstein (2006), empowerment has been associated with the reinforcement of an individual's participation in the process of decision-making; appropriate disease management, improved health behaviors (Tsay & Hung., 2004; Lorig et al., 2003; Lorig et al., 2001; Roberts, 1999); increased satisfaction with doctor-patient communication; and better access and efficiency in the use of health services (i.e. reduce utilization) (Holden et al., 2004; Lorig et al., 2003; Lorig et al., 2001; Endicott et al., 2003). In a word health literacy would provide the individual with the necessary skills and knowledge to engage competently in their own health-care and empowerment will be the motor that motivates the person to use these knowledge and abilities.

Health Literacy & Asthma Self-Management

Asthma is one of the most common chronic diseases worldwide (GINA, 2012). This health condition is caused by inflammation of the air passages in the lungs, and is characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person (Pascual & Peters,

2011). According to the World Health Organization, to date 235 million people around the world have asthma (WHO, 2014).

The prevalence of asthma in both children and adults has been rising over the last decades due to an increased predisposition to allergic reactions, attributable to a combination of genetic and environmental factors (Holgate et al., 2007). The rate of asthma increases as societies adopt western lifestyles and become urbanized (GINA, 2012). According to the measure of overall disease burden (i.e. disability-adjusted life years, DALYs) asthma has been estimated to have a DALYs of 15 million per year worldwide. This number is similar to the estimates for diabetes, cirrhosis of the liver, and schizophrenia (GINA, 2012).

The estimate of asthma mortality accounts for about one in every 250 deaths worldwide. Many of the deaths are preventable, and are due to suboptimal long-term medical care and delay in obtaining help during the final attack (Harrison et al., 2005). At least two-thirds of asthma deaths and hospital admissions as a result of asthma among young people are related to patient denial, lack of recognition of severity, and sub-optimal management (Partridge, 1995).

Different studies have reported that some of the main barriers in reducing the burden of asthma include lack of information (Park et al., 2010), underuse of self-management, and over confidence in short-term treatments (Portnoy, 2005). Furthermore, it has also being highlighted that the most cost-effective way of treating asthma relies on management approaches, which have been proven to reduce morbidity and mortality (GINA, 2012). Consequently, the self-management of asthma plays a key role in the control of this health condition. Asthma patients should be able to monitor symptoms, control allergens, comply with treatment, and be able to adjust medicines when necessary. These are some of the tasks included in the self-management of asthma, that when carried out adequately, have resulted in improvement of health outcomes (Ciaccio & Portnoy, 2009). Likewise, health literacy plays a crucial role in enabling patients to self-manage asthma (Rosas-Salazar, 2012). Thus, low health literacy has been found to exert a negative impact on asthma control, lead-

ing to high hospitalizations rates, emergency department visits (Mancuso & Rincon, 2006), uncontrolled asthma symptoms, morbidity (Thai & George, 2010; Clark & Nothwehr, 1997), lower asthma medication adherence, lower asthma related knowledge, improper use of Metered Dose Inhaler, worse physical functioning, and poorer quality of life (Mancuso & Rincon, 2006; Paasche-Orlow et al., 2005; Gazmararian et al., 2003).

Studies exploring the influence of health literacy on asthma self-management have commonly used functional health literacy tests, such as the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA) (Thai & George, 2010). However, there is a common agreement that more comprehensive health literacy tools should be designed to assess more advanced health literacy skills (Chinn, 2011; Nielsen-Bohlman et al., 2004; Nutbeam, 2000).

In summary, health literacy has been recognized as an important factor influencing health behaviors and health outcomes. However, its definition is still evolving and the tools available for its measurement mostly target functional skills, such as reading, writing and numeracy. Thus, measurement tools to assess more advanced health literacy skills are needed. Consequently, *judgment skills* have been proposed as a part of these advanced skills in order to explore individuals' abilities to recognize the means that lead to the attainment of health. Such skills are particularly important in the context of chronic diseases, as they require long-term commitment by patients to promote self-care. Asthma self-management is a good example of this.

Structure of the dissertation

This dissertation is a collection of three independent and interrelated empirical papers written in collaboration with Prof. P.J. Schulz. They describe the different stages of the development, testing, and operationalization of a judgment skill tool for the context of asthma self-management. This project was conducted between the years

2011 through 2013 at the Institute of Communication and Health at the University of Lugano.

The project was divided into three independent and interrelated studies. Study I was carried out to develop a judgment skills tool in the context of asthma self-management developed using a scenario-based format. The development of the tools was based on discussions with patients and lung specialists, and a Delphi study (i.e. panel of experts in lung diseases consulted to assess the content validity of the scenarios and to build consensus on the ranking of the response options); Study II was carried out as a pilot study, to explore constructive and destructive asthma self-management practices in relation to patient's judgment skills, using the newly developed tool; and study III was carried out to assess the impact of psychological empowerment, and different health literacy elements, including judgment skills in the service of asthma self-management practices.

The three papers composing this dissertation are presented in different chapters. Chapter II describes the development and results of study I. Its aim was to develop a judgment skill tool addressed to patients in the context of asthma self-management. The first stage of this study was to develop a tool using a scenario-based format. Thus, brief descriptions of common situations encountered by asthma patients were drafted. Information for these situations was based on a revision of scientific literature concerning the main problems encountered by physicians and patients concerning asthma self-management. In addition, several discussions with patients and physicians were carried out. During the second stage of this study a three-round Delphi study was carried out with 12 experts on lung diseases. The aim was to assess the content validity of the scenarios and to build consensus on the ranking of the response options. This study resulted in the development of a judgment skills tool composed of 19 scenarios with 4 response options each. The topics included in the tool address *exercise, doctor-patient communication, information seeking, triggers control, symptoms recognition, and medicine usage*.

Chapter III describes the development and results of study II. The aim of this was to explore constructive and destructive asthma self-management practices in relation to patients' judgment skills, using the newly developed tool among 80 asthma patients. This study also helped identify forthcoming problems for the third and main study. Recruitment of patients was carried out through medical offices. The questionnaire was self-administered and contained functional health literacy questions, judgment skills scenario-based questions, the Asthma Control test, and self-management questions addressing medication use, doctor's consultation, and triggers control. Preliminary results from this study indicated that eight out of the initial 19 scenarios developed in study I needed to be deleted from the tool due to poor performance. Further analyses were carried out using the other 11 remaining scenarios. These analyses resulted in the categorization of participants in a High and a Low group according to their level of judgment skills. Positive associations were found between high judgment skills and asthma self-management. The High-judgment group consulted their doctor more when experiencing asthma problems $t(76) = -2.18$, $p < .032$; complied more with the use of their control medicine $t(77) = -3.24$, $p < .002$; and went more regularly to the doctor $t(78) = -1.80$, $p < .038$ (one-tailed) than the Low-judgment group. This study resulted in the refinement of the judgment skills tool and in a preliminary exploration of the association between judgment skills and asthma-self-management practices.

Chapter IV describes study III. This is the final and main study of the project in which a questionnaire was designed to measure all aspects of the Health Empowerment Model, using validated scales from other studies, and the judgment skill tool developed in this project. For this, 236 asthma patients were recruited from medical offices in the Italian-speaking region of Switzerland and bordering cities of Italy. The questionnaire was self-administered and contained items assessing communicative and critical health literacy, judgment skills, empowerment, and asthma self-management. These last tackled medication use, doctor's consultation, and triggers control. Findings from the study revealed that judgment skills ($B = 2.06$, $p < 0.001$)

and empowerment ($B = 0.31$, $p < 0.001$) have a significant and positive influence on the use of asthma medicines, appropriate doctor's consultation, and triggers control. Whereas critical and communicative health literacy ($B = -0.27$ $p < 0.05$) appeared to have a significantly negative effect on the aforementioned self-management practices. Furthermore, results from this study endorse the use of the Health Empowerment Model to explain the influence of its components (38% variance explained) on health-related behaviors.

Chapter V is a general conclusion of the contribution of this study to the field of health literacy and the context of asthma, the generalization of its findings and its limitations. Furthermore, directions for future research concerning judgment skills within the field of health literacy, and the role of these on the self-management of chronic diseases are provided.

CHAPTER II

Judgment skills, a missing component in health literacy:

Development of a tool for asthma patients

Ana Maria Moreno Londoño & Peter J. Schulz

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Abstract

Health literacy has been recognized as an important factor influencing health behaviors and health outcomes. However, its definition is still evolving, and the tools available for its measurement are limited in scope, generally targeting functional skills including reading, writing, and numeracy. Based on the conceptualization of health literacy within the Health Empowerment Model, the present study developed and validated a tool to assess patient's judgment skills within the context of asthma self-management. These skills are conceptualized as a more advanced health literacy skill needed to establish a better partnership with healthcare professionals and to have a more active role in disease self-management. Several interviews with pulmonologists and asthma patients were conducted. From these, 19 scenarios with four response options each were drafted and assembled in a scenario-based questionnaire. Furthermore, a Delphi procedure was carried out to validate the tool with the participation of 12 specialists in lung diseases. The face and content validity of the tool were achieved by face-to-face interviews with 2 pulmonologists and 5 patients. Consensus among the specialists on the response options was achieved after the three round Delphi procedure. The final tool has a 0.97 intra-class correlation coefficient (ICC), indicating a strong level of agreement among experts on the ratings of the response options. The ICC for single scenarios range from 0.92 to 0.99. The developed tool provides a final score representing patient's judgment skills regarding asthma self-management practices based on specialist consensus. Furthermore, this tool contributes to enriching the measurement of more advanced health literacy dimensions.

Keywords: Health literacy, Judgment skills, Asthma self-management, Delphi methodology

Introduction

Increasing attention has been paid to the impact of health literacy on people's health behavior and health outcomes (WHO, 2013). An early conceptualization of this entailed basic reading, writing, and numeracy abilities needed to perform adequately as a patient (Ratzan, 2001). These abilities included being able to read and comprehend medication labels, appointment slips, and other essential health-related materials (Gazmararian et al., 2003).

Nowadays, the conceptualization of health literacy has been considerably broadened. This refers to the "degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Ratzan & Parker, 2000: p. ix). Notwithstanding the wide-spread use of this broader definition, there is a visible discrepancy between its conceptualization and the way it is measured (Chinn, 2011). The measurement tools are still addressing reading and writing abilities, something that is more in line with the earlier conceptualization of health literacy rather than with the current one. Thus, such tools are unable to measure more advanced dimensions as the ones suggested by the present conceptualization (Berkman et al., 2011; Easton et al., 2010; IOM, 2009, Rootman & Gordon-EI-Bihbety, 2008). Among the efforts to broaden the early conceptualization of health literacy, Schulz & Nakamoto (2013) proposed an integrative dimension of health literacy named judgment skills. These skills refer to individuals' abilities to identify the necessary means to attain good health as one of their goals (Rubinelli et al., 2009). These means entail the recognition of one's own needs, capabilities, and limitations regarding one's own health care, and the recognition to establish a partnership with healthcare professionals as part of these means (Rubinelli et al., 2009).

Judgment skills will allow patients to recognize their own competencies to skillfully carry out health care tasks, and to recognize the importance of establishing a partnership with healthcare professionals through asking questions, and discussing

information leading to effective self-management. Thus, judgment skills are particularly important in the context of chronic diseases such as asthma. The self-management of this condition requires that patients carry out multiple tasks including monitoring symptoms, adjusting medicines, and controlling for triggers. Such tasks require engaged patients embracing their competencies and recognizing their limitations; thus, they require establishing active communication with health care professionals. Furthermore, positive associations have been found between effective asthma self-management and asthma outcomes (Ciaccio & Portnoy, 2009).

Asthma is one of the most prevalent chronic conditions affecting approximately 235 million people worldwide (WHO, 2014). It is an inflammatory disease of the airways and requires a lifelong adherence to medication. Much of the mortality and morbidity of asthma is associated with preventable factors. At least two-thirds of asthma deaths and hospital admissions among young people are related to patient denial, lack of recognition of severity, sub-optimal management (Partridge, 1995), and low health literacy of patients (Thai & George, 2010). Moreover, low literacy has been also related with high hospitalization rates, emergency room visits, uncontrolled asthma symptoms, and morbidity (Clark & Nothwehr, 1997). The prevalence of asthma in Switzerland is about 6% (Leuppi et al., 2006) and half the sufferers have insufficient asthma control partly due to inappropriate self-management practices (Leuppi et al., 2006) making it a suitable setting for recruiting patients and exploring the role of judgment skills in asthma self-management.

Exploring the influence of judgment skills in the asthma context can provide a deeper understanding of how advanced health literacy skills may affect constructive and destructive asthma self-management practices. Therefore, the aim of the present study was to develop a tool that assesses patients' judgment skills on asthma self-management competencies using as a setting the Italian-speaking region of Switzerland.

Methods

The judgment skills tool was developed based on the Situational Judgment Test format. This describes hypothetical situations in which a problem arises, and a list of plausible courses of actions is displayed. The scenarios developed in the present questionnaire describe typical asthma self-management situations where the patient faces a problem, and a list of possible response actions by the patient is given. These response actions tackle the different means needed to attain good health as conceptualized in the judgment skills. Thus, it describes the recognition of asthma competencies, their limits, and needs to discuss problems and other health-related information with practitioners. Situational Judgment Tests have been used successfully for years in different contexts such as healthcare (Evans & Donnelly, 2006), work psychology (McDaniel et al., 2006), and personnel selection (Motowidlo et al., 1990).

Several educational programs for asthma patients are aimed primarily at informing patients (Clark & Nothwehr, 1997). However, the connection between knowing facts about a health condition and implementing the recommended behavior has not yet been determined (Becker, 1990). Thus, assessing judgment skills of asthma patients using the situational judgment test will result in having richer insights about how patients would behave in common situations regarding the care of their asthma rather than only assessing their factual knowledge.

The questionnaire was built in three stages. In stage I, twenty-two scenarios with their corresponding response options were drafted. These were built based on information from the scientific literature regarding asthma self-management problems, one patient focus group, several patient interviews, information from online patient forums, and several discussions with pulmonologists. In stage II, a Delphi study with a panel of twelve experts on the field of lung diseases was carried out to assess the content validity of the scenarios and to build consensus on the ranking of the response options. In stage III, a scoring scale was generated for the developed ques-

tionnaire. Ethical approval was granted from the ethical committee of the Canton Ticino, Italian-speaking region of Switzerland (i.e. Comitato Etico Cantolane FN132445.Rif.CE2453).

Stage I: Construction of scenarios

A review of the scientific literature on asthma self-management was carried out. The purpose was to identify the main problems encountered by doctors and asthma patients regarding care and treatment. The databases, ScienceDirect, PubMed, and the Cochrane library were explored using several key words alone or in combination for the search. These key terms were identified by consulting The Global Initiative for Asthma guidelines (GINA) on general competencies and tasks that every asthma patient should have (GINA, 2012). This included therapy use, symptoms recognition, and control of triggers. The search was restricted from the early nineties up to the present, with two exceptions for the eighties. These two last studies were included because they also developed a scenario-based tool in the context of asthma (Sibbald et al., 1988; Avery et al., 1980). Since some of the situations recreated in these former scenarios have common ground on the onset of an asthma attack, information from them was added to the description of the scenarios in the present study. Furthermore, different online asthma patient forums were screened for recurrent and communal topics on problems encountered with self-management. Topics that consistently appeared through all consulted sources were grouped into six general topics: *doctor-patient communication*, *medicine usage*, *information seeking*, *triggers avoidance*, *symptoms recognition*, and *exercise*. Under these general topics, several sub-themes were tackled within the single scenarios.

Following the discussion with a specialist, one patient focus group composed of four persons and five patient semi-structured interviews were carried out. Participants were men and women, ranging from 20 to 60 years old, all of them with university level education. Almost 60% of participants were using asthma medicine, 70% had an asthma attack in the previous year, and the majority of them suffered

from allergic asthma. All participants live in the Italian-speaking region of Switzerland.

Discussions within the focus group and the interviews were structured around similarities between the scenarios and the participants' own experiences, descriptions of their self-management strategies, compliance with therapies, and communication with their physicians.

A total of 22 scenarios were drafted. After consulting with a pulmonologist, three scenarios were deleted due to lack of generalization to the majority of the asthma patients, leaving 19 scenarios in the questionnaire. The following are the six topics used to draft the situations for the judgment tool:

(a) *Doctor-patient communication*: The control of triggers, the recognition of symptoms, and the appropriate use of medicines are some of the key tasks required to achieve asthma control. Doctors play a fundamental role in making patients follow these practices. Several studies reported that the most common causes for non-compliance with therapies is a poor comprehension of the treatment regimen (Cochrane et al., 1999; Stewart, 1995), inaccurate recall on how to follow the treatments (Roter & Hall, 2006), and mismatches between what physicians say and patients understand (GAPP, 2005). Six scenarios were created on this topic.

(b) *Medicine usage*: Under- and over-use of inhalers is still a big issue in asthma self-management. A substantial proportion of asthmatic patients misperceive the severity of their condition, due to the lack of symptoms recognition and insufficient understanding of what controlled asthma means, resulting in medication misuse (Adams et al., 1997). Thus, some patients underestimate symptoms leading them to under-use their medications, while others over-use them (Leuppi et al., 2006; Rabe et al., 2000). Furthermore, several studies report that asthma patients tend to reduce their medications when symptoms improve (Slejko et al., 2013), while most patients doubled their inhaled steroid as symptom severity increased (Lahdensuo et al., 1996). Four scenarios were developed for this topic.

(c) *Information seeking*: This behavior allows patients to be more autonomous and make informed decisions. Several studies show that patients who received asthma information from their physicians actively sought additional asthma information in bookstores, libraries and on-line resources (Clark & Nothwehr, 1997). In many cases patients seeking advice related to health information rely on laypersons and semiprofessional sources (Manfredi et al., 1993). Two scenarios were written for this topic.

(d) *Trigger avoidance*: There are several asthma triggers, but not all of them affect individuals in the same way and with the same intensity. Learning to recognize and identify their own susceptibility to triggers is highly recommended in asthma guidelines (GINA, 2012). Results from the focus group of the present study showed that participants managed their triggers depending on the level of negative impact on their health status. Thus, if asthma triggers interfered with their lifestyles, for instance owning a pet, or smoking, they would have different coping strategies to control triggers. These strategies included increasing the use of medicine, continuing to be active unless they felt really sick, or stopping for a while and trying again. Three scenarios were created for this topic.

(e) *Symptom recognition*: A significant proportion of patients underestimate asthma severity, which leads to a higher risk of morbidity or mortality (Nguyen et al., 1996). For asthma patients, it is a priority to be able to recognize symptoms at an early stage. Having the skills to engage in daily self-monitoring of how one's health condition is evolving, and then to take appropriate measures requires experience and knowledge. Two scenarios were developed for this topic.

(f) *Exercise*: This is highly recommended for asthma patients. However, different studies have reported that even patients with mild asthma find exercise challenging; the result is the limiting or avoiding of these activities in order to stay away from triggering symptoms (Mancuso et al., 2006). Two scenarios were drafted for this topic.

After the scenarios were drafted, the relevance of their content was evaluated by two pulmonologists belonging to the Delphi panel, as an assessment of content validity.

Stage II: Delphi study, validation of the scenarios

A Delphi study is an iterative survey conducted to obtain opinions and consensus of experts about a topic in their field of expertise (Landeta, 2006). It is carried out individually and anonymously over several rounds. After each round, the results are tabulated and reported back to the expert group. This procedure is repeated until a final agreement on the topic is achieved.

A total of twelve specialists on lung diseases participated in the Delphi study. Participants work in the Italian region of Switzerland, eight (75%) are specialist in lung diseases and internal medicine, and four (25%) in allergy and clinical immunology. On average, the participants have 23 years of work experience as specialists in the field of asthma. Most of them work at the main hospitals of the region and/or have their private practices in the cities of Lugano, Bellinzona, Mendrisio, or Locarno.

The Delphi survey among physicians was used to determine medical opinion on the adequacy of the response options and to validate the scenarios in general. Experts were asked to rate, on a 4-point Likert scale (i.e. adequate, rather adequate, rather inadequate, inadequate), each of the four response options for the 19 scenarios and were encouraged to recommend changes and adjustments in both response options and scenarios. A response option was considered to reach consensus when at least 60% of votes from doctors lay either on the adequate or the inadequate side of the scale. When a response option achieved consensus, it was shown in the next rounds, but with no possibility to be rated again.

The questionnaire was developed in English and translated into Italian by a native speaker. This was self-administered, in a paper-pencil format along with an

instruction sheet indicating how to rate the response options for each scenario. Table 1 shows an example of one of the scenarios assessed by the Delphi panel.

Table 1. Scenario presented to the Delphi panel for the rating of the response options

Your doctor has discovered that one of the main triggers of your asthma is your cat. Thus, he advised you to give up your cat because it is being detrimental for your health. Please, mark the adequacy level of each of the response options below				
	Most Adequate	Rather Adequate	Rather Inadequate	Most Inadequate
a. I would not follow my doctor's advice. I am sure that my cat is not triggering my symptoms.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I would follow the advice of my doctor and I would give up my cat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I would discuss with my doctor an alternative solution instead of giving up my cat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I would only increase the use of my medicine to treat the symptoms triggered by my cat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*the final scores for this scenarios were from Most Adequate to Most Inadequate b, c, d, a.

First round

For this round, participants were recruited at the annual meeting of pulmonologists working in the Italian-speaking region of Switzerland. Nine out of eleven specialists attending the meeting agreed to participate, and eight of them responded to the questionnaire. Therefore, two more specialists from the region were invited to participate in order to complete a group of ten experts, as initially planned (Figure 2). These two doctors were contacted through online directories of physicians in Switzerland. Inclusion criteria were a) having a specialty in lung diseases, and b) working with adult patients in the Italian speaking region of Switzerland. Participation was voluntary and no remuneration was offered.

From the first round, 15 out of 76 response options contained in the questionnaire were rated similarly by more than 60% of the doctors. One scenario depicting

the use of a new medicine and its side effects; and another, referring to the use of a Written Asthma Action Plan (WAAP), resulted in contradictory ratings due to a mismatch between the scenarios and their set of response options. Thus, these were discussed with one of the pulmonologists and replaced. The expert feedback and ratings helped to identify drawbacks of some scenarios, including coherence between the scenario and the response options, appropriateness of language, clarity of the topic, and precision in the description of the symptoms. Amendments regarding these issues were made for the questionnaire presented in the second round. Furthermore, before starting the second round of the Delphi, each of the panelists was interviewed about the realism of the situations described on the scenarios and the frequency of these situations happening in real life. All experts agreed that the content of the scenarios represented most of the common problems encountered in asthma self-management today.

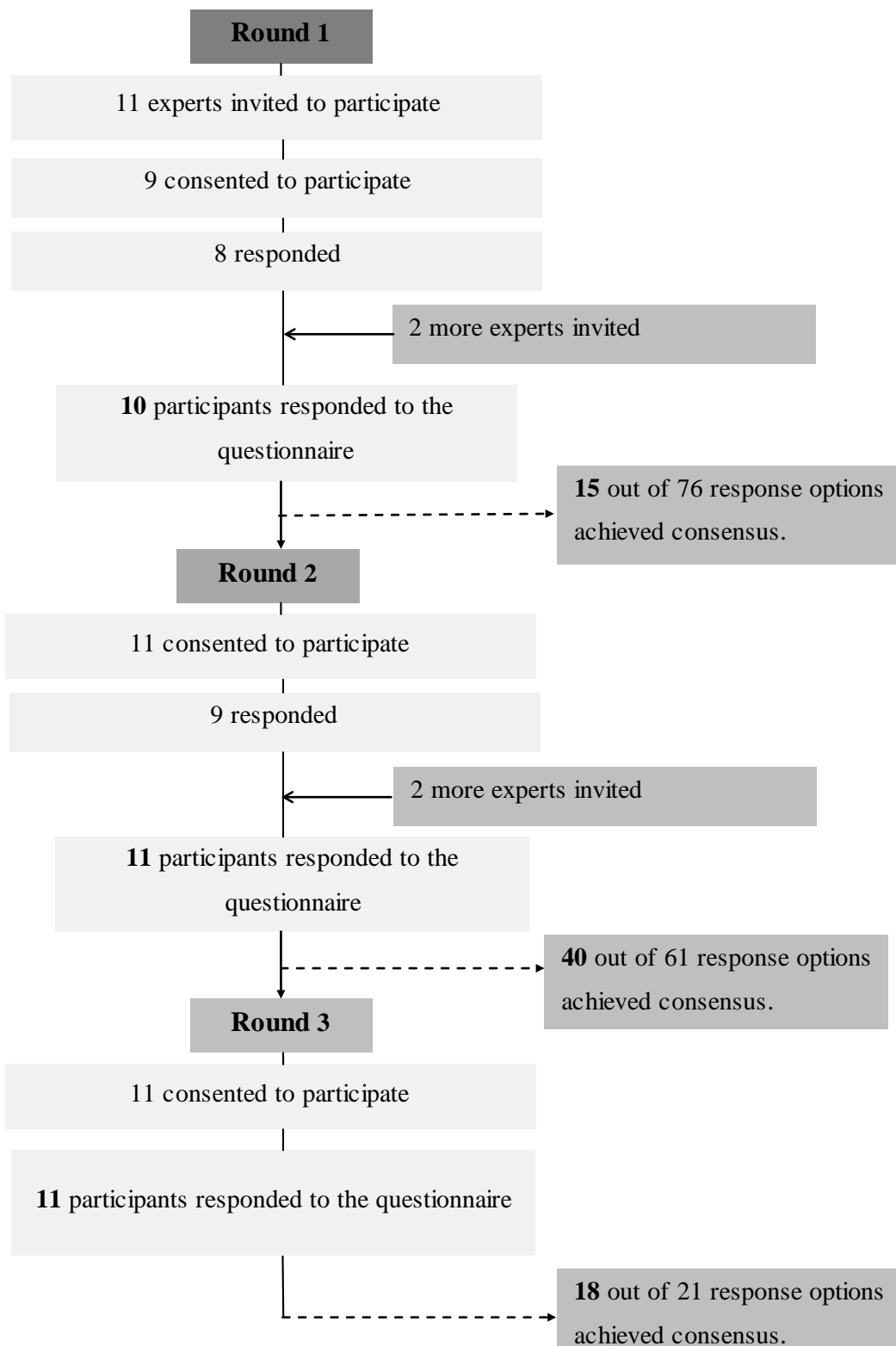


Figure 2. Flow of the recruitment, participation process of the Delphi panelist & consensus on response options achieved per round.

Second round

All ten experts who participated in the first round were available for the second round. Since only nine of them answered the questionnaire, two more doctors were invited to participate. Doctors were allowed to sustain their former answers, change them, or indicate whether response options were inappropriate for the scenarios.

From this second round, 40 response options out of the remaining 61 achieved expert consensus. Two scenarios tapping the use of WAAP and quitting smoking did not reach sufficient consensus, neither in the first nor in the second round; therefore, both were reformulated using information drawn from the focus group and interview material. The remaining 21 response options that achieved only partial consensus in the second round were discussed with a second pulmonologist and amended for the third round.

Third round

Eleven doctors participated in an online survey designed to rate the remaining controversial response options. Only two of these responses did not achieve the established cut off point. The majority of experts who participated in the first and second round responded to this survey.

Stage III: questionnaire scoring

A ranking of the response options was generated based on the results of the Delphi study. A few months after the Delphi study, doctors were invited to confirm the accuracy of the generated ranking, or to propose a different one in case of disagreement. Nine doctors responded to this survey and only three of the scenarios did not achieve a 100% agreement on the established ranking. Since two of these scenarios reached a 78% agreement and the other, 67%, no modifications on the ranking were made.

Each response option was scored from 1 (most inadequate) to 4 (most adequate). A sum scale of all 19 scenarios with 4 response options each resulted in a minimum score of 19 and a maximum score of 76. Higher values represent higher judgment skills, indicating a better identification of the means to attain good health including recognition of the importance to establish a partnership with healthcare providers, and acknowledgement of personal health competencies and their limits.

Results

Intra-class correlation coefficients (ICC) were calculated to measure the similarity on doctors' ratings in the three Delphi rounds. The overall ICC for the 76 response options corresponding to the 19 scenarios was 0.97 (Figure 3), and the ICC for the single scenarios ranged from 0.92 to 0.99.

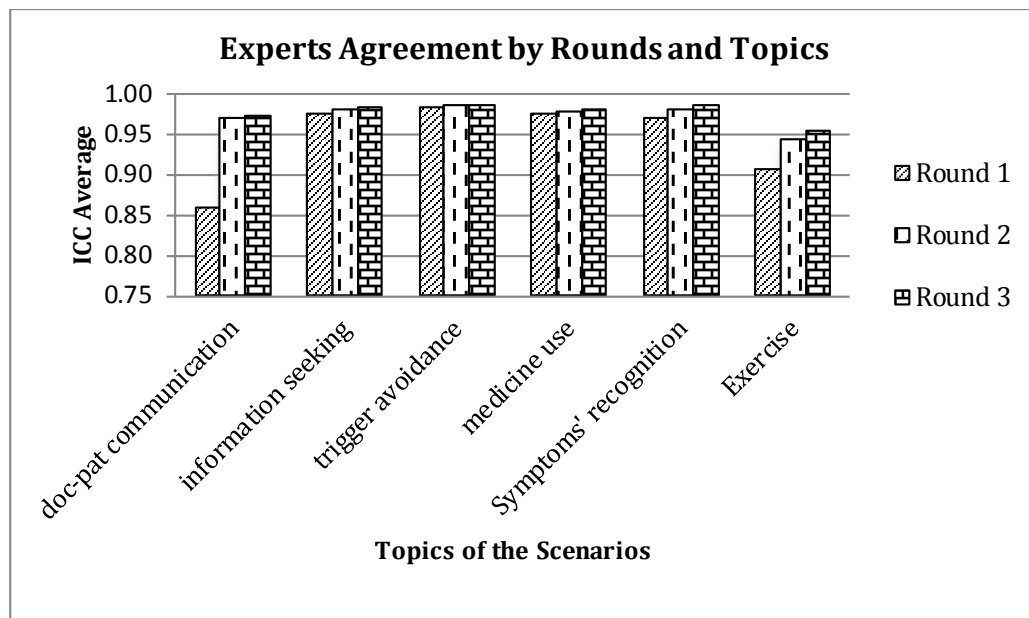


Figure 3. Improvement on doctors' agreement on the response options rating.

In the final round, only two response options belonging to two different scenarios achieved less than the established cut-off of point of 60% expert agreement.

However, they were not modified again, since the ICC coefficients for both scenarios were high, 0.98 and 0.92 respectively, plus the most adequate and most inadequate response options for these scenarios were already identified in the prior rounds. One of the scenarios is about trigger avoidance (pets). The response option stating that the patient will ask the doctor for an alternative solution rather than giving away the pet created divided opinions among the doctors. The other scenario describes a situation of doctor-patient interaction, with the doctor changing the patient's medicine without further explanation. The response option where the patient asks the doctor to prescribe his former medicine, instead of the new prescribed medicine, created some divided opinions as well. Appendix I contains the experts' ratings per scenario, the round in which the final agreement for the response options were achieved, and the final ICC per scenario. The presence of converging results on the ratings from the experts secures the content validity of the scenarios and response options. Thus, the final judgment skills tool comprises 19 scenarios with a set of four response options (Appendix II).

The following is an illustration of how response options achieved consensus in the Delphi study. Scenario: "You are in a public park talking with your friends, and after some time, you start feeling breathless. Fortunately, you have your rescue medicine with you. What would you do in this situation?" (a) use the inhaler on the spot, (b) look for a quiet place away from the public for using the inhaler, (c) judge the situation as uncontrollable, or (d) not use the medicine because you consider it is not necessary. Consensus for option (a) was achieved in the first round with a full agreement among the 10 doctors as to the most adequate response. Consensus for the rest of the options was achieved in the second round. Thus, for option (b), eight in eleven doctors agreed that this was a rather adequate answer to the situation. For option (c), ten in eleven doctors agreed that this was inadequate, and for option (d), eight experts in eleven concurred that this response was as well inadequate. Thus, the level of adequacy of the 4 response options for this scenario was determined.

Discussion & Conclusion

This study describes the development and validation of a tool to assess patient judgment skills in the context of asthma self-management. The questionnaire was developed using the situational judgment test format (SJTs), and it is composed of 19 scenarios with four response options each, addressing the topics of *doctor-patient communication, trigger avoidance, information seeking, medicine use, symptoms recognition, and exercise*. The validation of the tool was conducted in a 3-round Delphi procedure. Twelve experts in the field of lung diseases participated in rating the level of adequacy of the response options. The intra-class correlation coefficient of the questionnaire is 0.97 with coefficients of the single scenarios ranging from 0.92 to 0.99.

Nowadays, patients are requested to play a more participatory role in the healthcare system, helping with the decision-making regarding treatments, self-managing their health condition, and interacting effectively with healthcare providers, in order to be autonomous patients. This, in turn, requires health literate persons to be granted autonomy. To date the majority of tools available for assessing health literacy skills address reading, writing, and numeracy competencies (Chinn, 2011). However, there is a common agreement on the need for tools that assess skills beyond the functional ones (IOM, 2009). Therefore, the tool developed in this study contributes to fill this gap. This judgment skill tool seeks to assess the patient ability to identify the necessary means to attain good health including recognition of personal competencies, their limits, and the need to partner with healthcare professionals. Assessing these skills, particularly in the context of chronic diseases, is important since self-management plays a key role in the daily care of long-term conditions. Thus, it is crucial that patients recognize promptly and effectively these ‘means’ as key pathways to attain good health. Thus, judgment skills will allow patients to recognize their own competencies to carry out health care tasks skillfully, and to recog-

nize the importance of establishing a partnership with healthcare professionals through asking questions and discussing information.

Asthma patients are responsible for judging when to take their medicine, what to do when experiencing symptoms, when to call the doctor, and when to go to the emergency room (GINA, 2012). Depending on the level of their judgments skills, self-management can lead towards constructive or destructive practices. To the best of our knowledge, the study and operationalization of judgment skills in the context of asthma self-management is something that has not yet been assessed. This approach is new in the context of health literacy and might open a new path that contributes to better understanding the impact of judgment skills on health behaviors.

As highlighted before, adequate self-management in asthma has a positive impact on achieving optimal asthma control, improvement of health outcomes, and quality of life (Mancuso & Rincon, 2006; Gibson et al., 1995; Clark NM & Nothwehr, 1997).

The strengths of this study rely on the use of the situational judgment test for the questionnaire, since this has been recognized as successfully predicting individuals' performance (Motowidlo et al., 1990). Furthermore, the use of a Delphi procedure to validate the adequacy of the response options from a medical point of view also reinforces the validity of the tool. Although the discussions with asthma patients were also a valuable part of the present work, participants were highly educated, and this might have led to underestimating the understanding of the scenarios and reading skills of less educated participants. The SJTs are context-specific instruments, creating the necessity of adapting the accepted tool to every particular condition. However, the topics addressed in the scenarios were mainly based on international scientific literature of asthma self-management, thus making them simpler to adapt to other contexts. Furthermore, the steps taken for the tool development can serve as a guide to develop similar tools for other conditions.

The developed tool contributes to enriching the measurement of health literacy within a more advanced dimension. Assessing patient's judgment skills will serve

to evaluate their influence on self-management practices and to design better health communication strategies for patients that lead to the recognition of the necessary skills to improve self-management practices including own health competences and the importance of establishing a partnership with health care providers.

CHAPTER III

Impact of patient's judgment skills on asthma self-management: A pilot study

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Abstract

The majority of current health literacy tools assess functional skills including reading, writing, and numeracy. Although these tools have been able to underscore the impact of these skills on individuals' health behaviors, there is a need for comprehensive measures targeting more advanced health literacy skills. The individual's ability to identify the necessary means (i.e. health competencies, limits of these, and doctors' partnerships) to attain good health has been conceptualized as judgment skills. The present study used a newly developed tool to assess patient judgment skills in asthma self-management. A total of 80 asthma patients were recruited from medical offices. The questionnaire was self-administered and contained health literacy items, including questions that addressed functional and judgment skills, the Asthma Control test, and several self-management questions. Sixty-nine percent of participants had adequate health literacy, while 24% and 5% had marginal and inadequate levels, respectively. Participants were divided in two groups, High and Low judgment. The High-judgment group consulted their doctors when experiencing asthma problems $t(76) = -2.18$, $p < .032$; complied more with the use of their control medicine $t(77) = -3.24$, $p < .002$ and went more regularly to the doctor $t(78) = -1.80$, $p < .038$ (One-tailed) than the Low-judgment group. The judgment skills tool served to classify individuals according to their skills levels and to explore to what extent these skills influenced destructive and constructive self-management practices.

Keywords: Health literacy, judgment skills, asthma self-management, pilot study.

Introduction

In the last several decades, enormous attention has been paid to health literacy due to its demonstrated influence on health behaviors and health outcomes (Ratzan and Parker, 2000). The most commonly-used measures have focused on assessing reading, writing, and numeracy skills (Berkman et al., 2004). Although so far these measures have shown a well-established relationship between health literacy and health outcomes (Berkman et al., 2011), these fail to capture more advanced health literacy dimensions needed for individuals to function properly within a health care context (Nutbeam, 2000). Therefore, there is a need to develop reliable tools that can assess skills that go beyond these functional abilities. Schulz & Nakamoto (2013) proposed that health literacy be composed of a dimension known as judgment skills. These skills refer to individuals' abilities to identify the necessary means to attain good health as one of their goals (Rubinelli et al., 2009). These means entail the recognition by the individual of his or her needs, capabilities, and limits regarding his or her own health care, and the recognition that establishing a partnership with healthcare professionals should be a part of these means.

In previous research, a scenario-based tool measuring patients' judgment skills on asthma self-management was developed (Moreno Londoño & Schulz, 2014). This tool is composed of nineteen scenarios describing common situations that asthma patients may face, including medicine use, trigger control, symptoms recognition, information seeking, doctor-patient communication, and exercise. The tool was developed within the context of asthma self-management, since this is a chronic condition that poses high demands on patients. Thus, it requires that patients be actively engaged so that they can contribute to their self-care routines. Managing asthma entails following strict medical regimens, using medicines properly, avoiding asthma triggers, and recognizing symptoms. If asthma patients are unable to recognize their health competencies, or do not understand their limits regarding these competencies, or the need to establish a partnership with healthcare professionals as

necessary means (i.e. judgment skills) to attain and maintain good health, it would be difficult to achieve proper asthma control.

The use of this tool will allow for a better understanding of the influence of judgment skills on destructive and constructive asthma self-management practices from a more advanced health literacy dimension. Thus, the aim of this pilot study was to explore patients' asthma self-management practices including medication use, triggers avoidance, and doctors' consultations using the judgment skills tool developed in the prior study.

Methods

Measures

In addition to the scenario-based tool to assess judgment skills, other variables were included. The purpose of this was to explore possible relationships among judgment skills, functional health literacy, asthma status, and asthma self-management. Therefore, the questionnaire for the pilot study was composed of five sections.

The *first section* included a validated scale with three screening questions to detect inadequate functional health literacy: “*How often do you have someone help you read hospital materials?*”; “*How often do you have problems learning about your medical condition because of difficulty understanding written information?*”; “*How confident are you filling out forms by yourself?*” (Chew et al., 2008). These were measured on a 5-point scale ranging from *always* to *never* (score 1-5). The *second section* contained the judgment skills tool composed of nineteen scenarios (Appendix II). This tool assessed individuals' abilities to identify the necessary means to attain good health (i.e. recognition of one's own health competencies as well as their limits, and the ability to acknowledge the need to establish a partnership with health care professionals). Participants were offered four options to respond to each scenario. Every response option had scores ranging from 1 to 4, with higher scores indicating better judgment skills. The ranking of the response options and the

validity of the scenarios was determined in a prior study by a three-round Delphi panel composed of twelve experts in the field of lung diseases (Moreno Londoño & Schulz, 2014). Some of the scenarios include information from a former tool in the context of asthma (Sibbald et al., 1988; Kolbe et al., 1996). Following each scenario a question about prior experience of a similar situation was added. The purpose of this was to explore whether having a prior experience in a similar situation affected the answer to the scenario, and to verify that the described scenarios matched the most common situations for asthma patients. The *third section* contained a validated test for asthma control (ACT), which included five questions measured in a 5-point Likert scale. This assessed asthma symptoms and medicine usage in the last four weeks (Nathan et al., 2004). The *fourth section* comprised seven questions on self-management behaviors (3 and 5 point scales) (e.g. compliance with control medicine, rescue medicine, avoidance of triggers, consultation with doctors when asthma problems arise) and five questions on medical history (e.g. smoking behavior, years living with asthma), both drawn from a prior study and from asthma guidelines (Laforest et al., 2009; GINA, 2012). These last two sections were selected as outcome measures. It was expected that people with higher judgment skills would have better asthma control and better self-management practices. The *last* section included patients' demographics to describe the study population.

The questionnaire was pre-tested among ten asthma patients who did not belong to the pilot study, and it was revised by two experts in questionnaire development before conducting the pilot study. Ethical approval was granted from the ethical committee of the Canton Ticino, Italian-speaking region of Switzerland (i.e. Comitato Etico Cantolane FN132445.Rif.CE2453).

Recruitment

Thirty-one out of 66 health care professionals, working in the field of asthma, including pulmonologists, allergists, general practitioners and physiotherapists in the Italian part of Switzerland accepted the invitation to participate in the recruitment of

patients. Generally, refusal to participate was due to the lack of access to asthma patients. The recruitment of the patients was done during the medical consultation or by medical assistants while patients waited for their appointments. To encourage participation, asthma patients were asked to fill out the questionnaire anonymously and at their own convenience, either in the waiting room or at home. The majority of participants chose the second option, in which case a stamped return envelope was provided as well. The administered questionnaire was in a paper-pencil format, self-reported, and in the Italian language. Besides the questionnaire, patients received an instruction sheet on how to fill it out, an informed consent form, the approval of the ethics committee, general information about the project, and the funding source.

Participants

The eligibility criteria for patients to participate were that they be at least 18 years old, were diagnosed with asthma by a physician, were in treatment for or had asthma symptoms or attacks in the previous year, being fluent in Italian and living in the Italian-speaking region of Switzerland. Based on these criteria, 80 asthma patients were recruited in approximately six months. The majority of the respondents were females, 67% (54), with a mean age of 46 years ($SD = 15$); participants' ages ranged from 18 to 80. Educational attainment was categorized into three groups: *primary and secondary school* 19% (15), *high school/apprenticeship* 61% (49), and *university* 19% (15). The mean of years suffering from asthma was 21 ($SD = 14$), with 52% (42) suffering from persistent asthma and 44% (35) from intermittent asthma, and there was a high rate of non-smokers 82% (66). According to the Asthma Control Test (ACT) most of the population had their asthma under control in the last four weeks 59% (47), and the majority of participants were using asthma medicines at the time of the survey 72% (58).

Statistical analysis

Descriptive statistics were used to define the study population. For some analysis, missing values were replaced by individual scale means. This occurred

when at least 50% of the scale items were filled in to guarantee representative results. Kendall's tau_b and Pearson correlations were used when appropriate, according to the continuous or nominal nature of the variables. Correlations were used to explore possible relationships among self-management behaviors, judgment skills, health literacy, education attainment and asthma control. A composite score of judgment skills was computed for every participant based on the final 11 scenarios (i.e. eight scenarios were deleted during preliminary analysis due to low performance, including poor discrimination) ranging theoretically from 11 to 44, with higher values representing better judgment skills. The median split was used to create two judgment skills groups, high (score 37-44), and low (scores 28-36), by splitting the score along the median. The purpose of this was to categorize participants according to the level of these skills and to examine their influence in self-management practices. This partition is supported by the data, as 38% of people in the Low judgment group selected, on average, four times the most, or the second most inadequate option, whereas 47% of participants in the High judgment group selected these same options only once on average. This indicates that indeed the median split can be used as is not an arbitrary partition. Furthermore, several independent t-tests were carried out to explore possible group differences between the Low and the High judgment groups on self-management behaviors. P-values < 0.05 were considered statistically significant.

Results

Results indicated that more than half of the study population presented adequate health literacy 69% (55), while 24% (19) and 5% (4) had marginal and inadequate levels, respectively. The health literacy question regarding asking for help to read health information significantly correlated with educational attainment .226* (p<.048).

From the outcome measures, three variables significantly correlated with judgment skills: *fixing regular appointments with physicians*, *controlling medicine use*, and *consulting with physicians if asthma-related problems would arise*. However-

er, Asthma Control was not significantly associated with judgment skills. Furthermore several other significant correlations were found among self-management practices, education, health literacy, and the Asthma Control Test (Table 2).

Table 2. Correlations between judgment skills, functional health literacy, education, asthma control, and self-management practices

	Health Literacy	Judgment Skills	Education	Visits to Docs	Rescue Medicine	Control Medicine	Interrupt Control medicine	Triggers control	Prescription refill	Visit doctor if problems
Health Literacy										
Judgment Skills	-.085									
Education	.167	.093								
Visits to Docs	-.116	.222*	-.075							
Rescue Medicine	-.015	.154	-.180	.129						
Control Medicine	.053	.123	-.138	.290**	.300**					
Interruption of Control medicine	-.117	.373**	-.197*	.419**	.358**	.533**				
Triggers control	-.276*	.113	.023	.489**	.065	.006	.182			
Prescription refill	.030	.211	-.045	.311**	.023	.162	.196	.240*		
Visit doctor if problems	-.138	.247*	.003	.314**	.169	.050	.269*	.173	.216	
ACT	.121	.135	-.010	.055	.063	.103	.026	-.167	.083	-.214

Judgment skill tool

The initial version of the instrument included 19 scenarios covering the topics of *exercise and medicine usage, doctor-patient communication, information seeking, triggers control, symptoms recognition, and medicine usage*. After preliminary analysis, eight scenarios were deleted for different reasons. A scenario was deleted when more than 5% of the responses were missing, as was the case for scenario 8. This described a smoking behavior, something that does not relate to the non-smoking participants, preventing this part of the study population from responding to the scenario. Scenarios were also deleted when the majority of the participants selected the best answer, indicating lack of discrimination of responses, and when there was a low percentage of participants having experienced a similar situation in the past (Table

3). Despite these deletions the initial six self-management topics addressed by the judgment skills tool remained within the eleven final scenarios.

Table 3. Characteristics of the deleted scenarios

Scenario	Most Adequate	n	Most Inadequate	n	Missing	n	Past experience	n
Sc2.	52%	42	4%	3	1%	1	44%	35
Sc4.	15%	12	2%	2	-	-	27%	22
Sc6.	54%	43	4%	3	1%	1	15%	12
Sc8.	51%	38	5%	4	7%	6	29%	22
Sc11.	84%	67	4%	3	-	-	15%	12
Sc12.	92%	73	1%	1	1%	1	37%	29
Sc16.	91%	73	2%	2	-	-	33%	26
Sc18.	22%	18	-	-	-	-	59%	47

Results from the scenarios shows that only 29% of participants in the survey would give away their pet as suggested by the doctor when indicated as a major trigger of asthma (sc.10). More than half of the participants (67%) will use the rescue medicine in public places to alleviate their symptoms (sc3). Half of the participants will discuss with their doctor concerns about using a medicine known for its side effects (sc5). Sixty-five percent will discuss with their physician possible side effects found mentioned on the internet for a prescribed medicine (Sc7). Only 60% of patients will use rescue medicine to alleviate symptoms and continue taking the preventive medicine as indicated by the doctor (Sc13). Fifty-nine percent of participants considered that their asthma was controlled even after experiencing shortening of breath, cough, waking up at night, or not being able to do routine activities for a short period of time (sc15).

Low-judgment and High-judgment groups

Participants in the High-judgment group were more likely to communicate with their doctor when experiencing problems with their asthma ($M = 3.86$, $SD = 1.31$) than their counterparts in the Low-judgment group ($M = 3.24$, $SD = 1.21$), $t(76) = -2.18$, $p < .032$ (Figure 4).

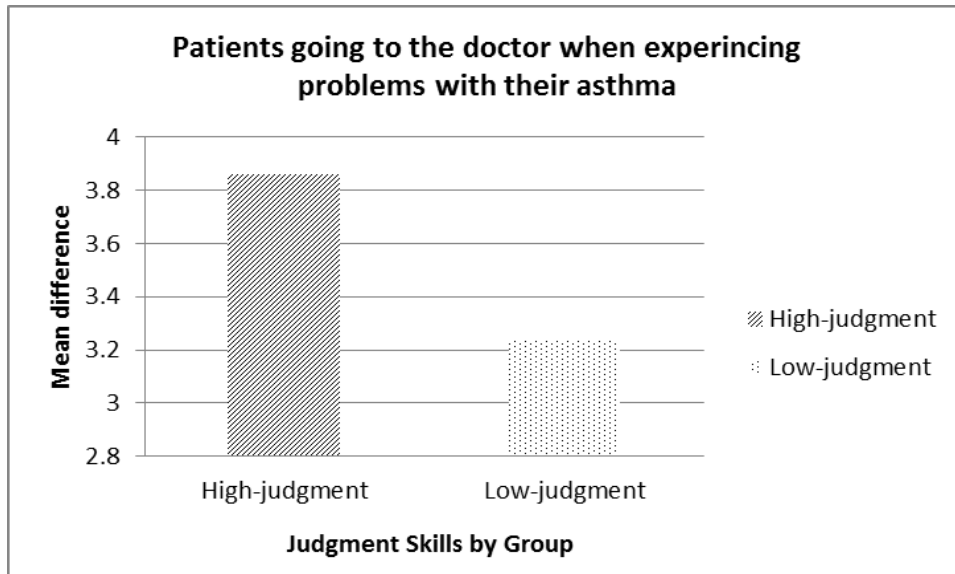


Figure 4. Mean differences between judgment groups regarding doctor's consultation if asthma problems arise.

Similarly, the High-judgment group was more compliant with the use of their control medicine as indicated by the physician ($M = 4.29$, $SD = 0.99$), than the Low-judgment group ($M = 3.41$, $SD = 1.33$), $t(77) = -3.24$, $p < .002$ (Figure 5).

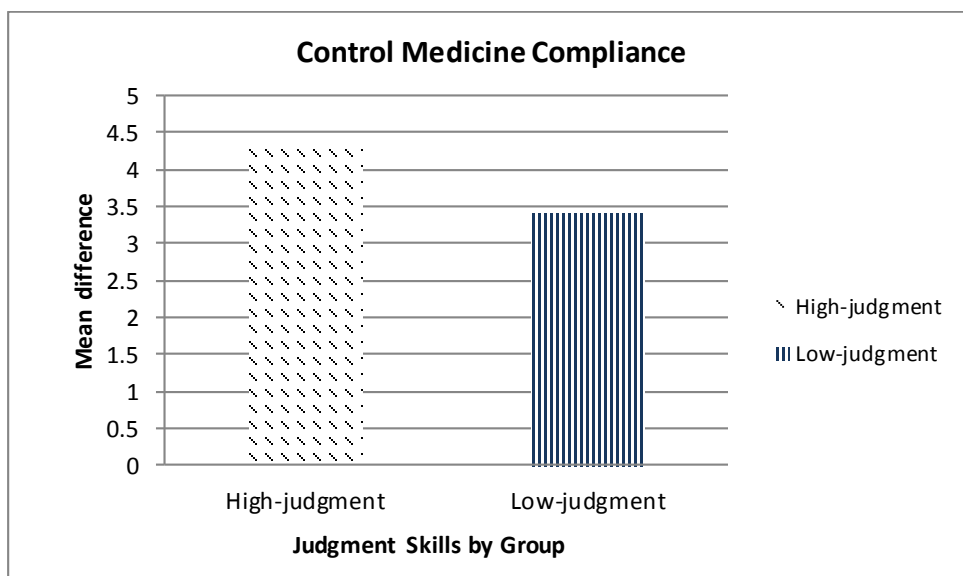


Figure 5. Mean differences between judgment groups regarding medicine compliance

Moreover, people with higher judgment skills went more regularly to the doctor ($M = 4.47$, $SD = .81$) than participants in the Low judgment group ($M = 4.07$, $SD = 1.13$, $t(78) = -1.80$, $p < .038$ (One-tailed)) (Figure 6).

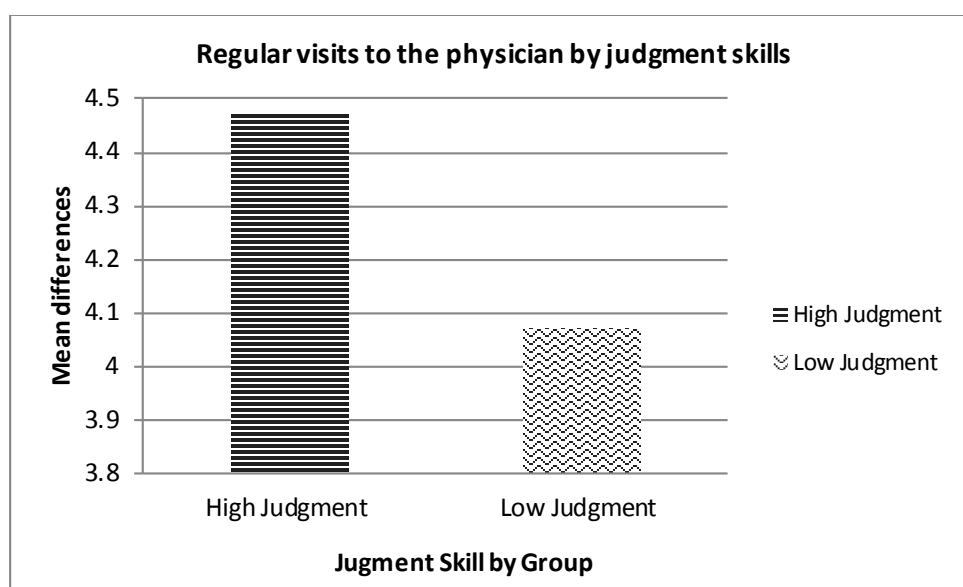


Figure 6. Mean differences between judgment groups regarding regular visits to physicians

Past Experiences

Each of the scenarios was followed by a question regarding similar past experiences as those described in the scenarios. Positive responses ranged from 17% (sc.7) to 72% (sc.13). The topics of the scenarios more commonly experienced by participants were as follows: experiencing symptoms in a public place (60%) (sc.3); recognizing asthma symptoms (61%, sc.14); having regular visits to the doctor (61%, sc. 17); and using the control medicine (67%, sc.19).

There was no association between having experienced a similar situation in the past and choosing the most appropriate response for the scenario. Having experienced a similar situation in the past was significantly related in some cases with self-management behaviors. Thus, people who in the past experienced symptoms while exercising (Sc1) ($M = 3.56$, $SD = 1.24$) interrupted their control medicine more often than those who had never experienced a similar situation ($M = 4.12$, $SD = 1.25$), t

(77) = -1.99, $p < .050$. Similarly, people who experienced asthma symptoms in a public place went to the doctor more often when experiencing problems with their asthma ($M = 3.79$, $SD = 1.178$) than people who had never been in a similar situation ($M = 3.13$, $SD = 1.360$), $t(76) = 2.270$, $p < .026$. Furthermore, people who had experienced symptoms in public places had less control over their asthma ($M = 3.64$, $SD = .913$) than people who had never had a similar situation ($M = 4.11$, $SD = .854$), $t(77) = -2.305$, $p < .024$.

Discussion & conclusion

This pilot study was conducted to explore patients' judgment skills in asthma self-management practices including medication use, triggers avoidance, and doctor consultations. Results of this study showed that participants with higher judgment skills contacted a doctor when they experienced problems with their asthma, were more compliant in the use of their control medicine, and made appointments with their physicians more regularly than participants with low judgment skills. Other results from the study show significant associations between several self-management practices and participants' past experiences as described in the scenarios. Thus, people experiencing asthma symptoms while exercising (Sc.1) were more prone to interrupt the use of their control medicine. Likewise, individuals who have experienced asthma symptoms in public (Sc. 3) tended to go to the doctor more often and had less control over their asthma than people who did not have similar experiences in the past. The findings of this study support the key role of patients in the self-management of asthma (Gibson et al., 2009; Thai & George, 2010; Denford et al., 2013). In general, asthma can be considered as a major impediment when managed poorly, or as a minor inconvenience when managed effectively (Tattersfield, 1997). Asthma patients are expected to play an autonomous role in self-management. They are responsible for recognizing symptoms, adjusting medicines, avoiding triggers, and being able to communicate problems and concerns to their health care providers, among others. When self-management is not carried out effectively, symptoms and

asthma attacks arise, leading patients to experience a decrease of quality of life (Bodenheimer et al., 2002; Thoonen et al., 2003), increased hospitalizations (Braman, 2006), unscheduled doctor's visits, emergency department use, and work days or school days lost (Gibson et al., 2009).

Due to the importance of asthma self-management, every patient should possess the necessary skills to carry out activities and behaviors that lead him or her to take appropriate self-care, which in turn results in better asthma control and improved quality of life. Judgment skills allow individuals to identify the necessary means to attain good health including recognition of one's own needs, capabilities, and limits regarding their health care, besides acknowledging the importance of establishing a partnership with healthcare professionals as part of this strategy. Results from this study show that when judgment skills are adequate, better self-management practices are observed in general. Thus, patients in the high judgment group reported better compliance with the control medication and consulted the doctor when asthma problems arose. Both self-management behaviors are in line with what is expected of appropriate self-care (GINA, 2012). This may indicate that patients in this group were more efficient in recognizing the "means" to achieve asthma control. A lack of appropriate response by patients experiencing an onset of an asthma attack (i.e. not calling emergency services) has been linked to inappropriate practical knowledge (Kolbe et al., 1996). Likewise, a study conducted among African American adolescents regarding asthma self-management found that 23% of the participants never sought help from other people at the first signs of breathing problems, and only 49% reported they always stopped their activities when experiencing breathing problems (Sin et al., 2004). Furthermore, several studies have reported that some of the reasons for under using control medicines are due to the misunderstanding of therapy by patients, poor knowledge about asthma medication (Paasche-Orlow et al., 2005), and fears and misconceptions about side-effects (Bosley et al., 1996; Cochrane et al., 1999). Along the same lines, results from a study of asthma self-management with adolescents reported that non-compliance with therapy was partly because patients

believed that the medical regimen did not have any effect on their symptoms; hence, patients selected which aspects of the regimen to follow, departing from medical guidance (Buston et al., 2000). Moreover, Bender et al., (2007) found that adherence to a daily controller medication was generally below the prescribed level, despite the fact that many participants suffered from severe asthma and frequent symptoms. In summary, some of the points highlighted by these studies to explain the lack of appropriate asthma self-management rely on judgment skills that help in the recognition of their own competencies, the limits of these, and the acknowledgement of the importance to establish a partnership with healthcare providers to clear doubts, respond to questions, and provide advice, guidance, and support to achieve adequate asthma control. Several studies have shown that, if there is a good partnership between doctor and patient, there is an increase in adherence to treatment, recall, and understanding of medical information (Chapman et al., 2000).

Furthermore, several authors have highlighted a latent dissonance between what is believed to be known and what is really known (Dowson et al., 2004). A study of asthma self-management found worrisome differences between practical self-management knowledge and behaviors during acute attacks. In most of these cases, the amount of knowledge did not reflect the reported action taken (Kolbe et al., 1996). Numerous educational programs rely heavily on information transfer as opposed to teaching skills to patients. However, knowing a range of facts about a disease neither guarantees a change in behavior nor proper use of information (Becker, 1990). Similarly, another study concluded that educational programs improved knowledge, but did not reduce asthma morbidity (Bernard-Bonnin et al., 1995). These results suggest that patient knowledge is crucial. However, more practical approaches are needed to integrate the known information to the behavior. Thus, when assessing educational interventions using a judgment skills tool may be more informative about how patients are using this information rather than factual knowledge tests.

Limitations of this study include reliance on the use of a self-reported tool, without objective measures of lung functioning to assess the level of asthma control, or objective health behavior measurements that indicate that patients behave as reported (Mortel, 2008). However, the advantages of a self-administered tool are that patient discomfort or embarrassment is avoided. Furthermore, although the scenarios describe common situations for asthma patients, the amount of reading might pose a burden on people with poor reading skills, discouraging participants to participate in the study and imposing a risk for random responses. To lessen those risks, participants were given the time to fill in the questionnaire at their convenience. Moreover, this study acknowledges the possible loss of measurement information due to dichotomization of the variables using the median split. However, this partition was necessary due to skewness of the composite score of judgment skills, with a high tendency for selecting the best options. However, for this particular case the median split had been accepted by other authors (MacCallum et al., 2002), and as shown in the results the data supported this procedure.

The assessment of judgment skills in the context of asthma self-management is something that to the best of our knowledge has not yet been explored. Findings from this study contribute to the health literacy field by providing an assessment tool that goes beyond the measurement of functional skills and sheds light on the influence of patients' judgment skills on asthma self-management practices. These skills include individuals' abilities to recognize the necessary pathways to achieve good asthma self-management, such as recognition of one's own health care competencies and the importance of establishing a partnership with healthcare providers. Thus, judgment skills play an important role on the health behavior of asthma self-management. The use of this tool is recommended to identify self-care aspects that should be addressed in patient education.

CHAPTER IV

Influences of health literacy, judgment skills, and empowerment in asthma self-management practices

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Abstract

To date the prevalence of chronic diseases such as asthma is growing. It is estimated that approximately 235 million people worldwide suffer from this condition (WHO, 2013). Moreover, the role of asthma self-management has been recognized as an essential factor for improvement of asthma outcomes and patients' quality of life (WHO, 2013). Likewise empowerment and health literacy have been point out as important elements for the management of chronic diseases. The present work proposed to study the influence of these elements in the self-management of asthma using the Health Empowerment Model (Schulz & Nakamoto, 2013). This study used a sample of 236 asthma patients recruited from medical offices in the Italian-speaking region of Switzerland and bordering cities of Italy. The used self-reported questionnaire contained items assessing communicative and critical health literacy, judgment skills, empowerment, and asthma self-management practices including medication use, doctor's consultation, and triggers control. Findings from this study revealed that judgment skills ($B= 2.06$, $p < 0.001$) and empowerment ($B= 0.31$, $p < 0.001$) have a significant and positive influence on the use of asthma medicines, appropriate doctor's consultation, and triggers control. Whereas critical and communicative health literacy ($B= -0.27$ $p < 0.05$) appeared to have a significantly negative effect on the aforementioned self-management practices. Furthermore, results from this study endorse the use of the Health Empowerment Model to explain health-related behaviors.

Keywords: Health literacy, judgment skills, empowerment, asthma self-management, Health Empowerment Model.

Introduction

The prevalence of chronic diseases such as asthma has been increasing due to more westernized lifestyles (GINA, 2012). To date there are 235 million people worldwide suffering from asthma (WHO, 2013; WAO, 2011). This health condition is due to inflammation of the air passages in the lungs, and it is characterized by repeated attacks of breathlessness and wheezing, which vary in severity and frequency from person to person (Pascual & Peters, 2011). Asthma accounts for about one in every 250 deaths worldwide. However, many of these deaths are preventable as they are due to patient denial, lack of recognition of severity, delay in obtaining medical help during the final attack (GINA, 2012) and sub-optimal management (Partridge, 1995). Some of these causes are closely related to the self-management of the condition. Thus, improving self-management will prevent detrimental health outcomes and reduce preventable deaths.

Asthma self-management has been highlighted as a key element for asthma control, and thus, for improvement of patients quality of life (Rand et al., 2012; Ciaccio & Portnoy, 2009). Self-management entails monitoring symptoms, controlling allergens, complying with treatment, using asthma action plans, and adjusting medicines when necessary. These are some of the tasks that, when carried out adequately, result in improvement of asthma outcomes (Ciaccio & Portnoy, 2009). Moreover, patients' health literacy, understood as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Ratzan & Parker, 2000: p. ix), influences the way self-management practices are carried out (Rosas-Salazar, 2012). Consequently, adequate health literacy, in the context of asthma self-management, has been associated with reducing hospitalizations, emergency room and unscheduled doctor's visits, days lost from work, episodes of nocturnal asthma, and indirect costs (Gibson et al., 2003). Inversely, inadequate health literacy was as-

sociated with asthma exacerbations, lower asthma medication, poor asthma-related knowledge, improper use of Metered Dose Inhaler and worse physical function (Gazmararian et al., 2003; Paasche-Orlow et al., 2005; Mancuso, & Rincon, 2006).

As reported by Thai & George (2010) health literacy in the context of asthma self-management was commonly measured with the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Test of Functional Health Literacy in Adults (TOFHLA). Although these tools have shed light on the impact of functional skills such as reading, writing, and numeracy on patients' health outcomes, several authors have highlighted the need for measuring tools that address more advanced health literacy dimensions (Chinn, 2011; Nutbeam, 2000).

The Health Empowerment Model (HEM) was proposed to understand health behavior in light of two constructs, health literacy and psychological empowerment (Schulz & Nakamoto, 2013). The authors of the model noted that the impact of health literacy on individual's health behavior must be studied in conjunction with a person's perception of his or her empowerment. In this model, the conceptualization of health literacy entails three elements, known as declarative knowledge (know-that), procedural knowledge (know-how), and judgment skills. *Declarative knowledge* refers to knowing factual information, e.g. asthma is an inflammation of the airways on the lungs. *Procedural knowledge* refers to the use of knowledge in the performance of a task e.g. following the steps to use an asthma inhaler. *Judgment skills* refer to individuals' abilities to identify the necessary means to attain good health as one of their goals (Rubinelli et al., 2009) e.g. a person who suffers from asthma and enjoys sports appraises several therapy options that allow him to continue sports activities without risking his health. Empowerment, on the other hand, was conceptualized in the field of workplace organization (Spreitzer, 1995). It refers to the individual's cognitive state characterized by a sense of perceived control, competence, and goal internalization (Oladipo, 2009). This multidimensional concept entails four elements: meaning, competence, self-determination, and impact. *Meaning* refers to the value patients give to the self-management of a disease, e.g., acknowl-

edging that taking care of one's health condition is very important; *competence* (also known as self-efficacy) denotes a patients' perception of his or her abilities to carry out a self-management task, e.g., claiming the ability to recognize symptoms and act upon them efficiently; *self-determination* denotes a patient's perception of the significance of autonomy in controlling his or her self-care and choosing from among different options, e.g. agreeing that one can choose between different therapies, and *impact* (also known as locus of control), denoting a patient's perception of one's influence on self-management outcomes, e.g., agreeing that things that one independently chooses will have repercussions on one's health (Spreitzer, 1995).

Both empowerment and health literacy have been recognized as key elements in the public health sector needed to improve health behaviors and health outcomes. Studies show that empowered individuals are proactively responsible for their own health, and autonomous in the decision-making processes, thereby reducing dependency on healthcare providers (Wallerstein, 2006; Holden et al., 2004; Lorig et al., 2003; Lorig et al., 2001; Endicott et al., 2003). The central component of psychological empowerment is the intrinsic motivation that makes patients take an active role in their own healthcare, that is, making them want to learn about their health condition, participate in the decision-making processes, and engage in activities that lead to the attainment of good health. Consequently, for this empowerment to be effective, patients also need to possess the necessary skills and health knowledge that allow them to engage safely and competently in their own health care (Wilson, 2001). Thus, as noted by the authors of the Health Empowerment Model, empowerment entails the motivation of the patients to engage actively in their own self-care making "[...] health-enhancing choices derived by knowledge and expertise," being this last the core of health literacy (Schulz & Nakamoto, 2011: p.66)

As mentioned earlier, the influence of health literacy in asthma self-management practices has been studied generally using functional health literacy tests assessing reading, writing, and numeracy skills (Thai & George, 2010). This study proposes to explore the influence of judgment skills, and communicative and

critical health literacy in conjunction with empowerment elements on asthma self-management practices. This study hypothesizes:

H1: The higher the judgment skill of a patient, the better is his or her asthma self-management.

H2: The higher the patient's critical and communicative health literacy is the better is his or her asthma self-management.

H3: The more empowered a patient is the better is his or her asthma self-management.

Methods

Procedure

The present cross-sectional study was conducted within an eight month period from June 2013 to January 2014. Findings from a pilot study showed the difficulties to recruit asthma patients in the Italian-speaking region of Switzerland as they could only be contacted when showing up for a medical appointment. Therefore, patients' recruitment was extended to bordering cities in Italy, including Brescia and Milan where specialized centers for asthma patients are common.

Recruitment of doctors

A total of 68 health care providers from the Italian-speaking region of Switzerland including pulmonologists, allergists, general practitioners, and physiotherapists were invited to participate in the recruitment of asthma patients; 27 of them accepted. All of them were found using online directories of practitioners in Switzerland, or by personal referral from other participant physicians. Different strategies were used to contact them. When possible personal appointments were preferred; otherwise other channels such as e-mail, formal letter, or phone calls were used. Among the physicians working in Italy 11 out of 16 accepted to help with the re-

cruitment of patients; all of them were contacted by referral from other doctors. No remuneration was provided.

Recruitment of patients

The inclusion criteria for patients were as follows: being diagnosed with asthma by a physician; being currently engaged in asthma therapy, or having had an asthma attack and symptoms in the last year. Furthermore, participants had to be at least 18 years old, and fluent in Italian. Based on these criteria, 252 questionnaires were collected from patients. However, sixteen of them were excluded as more than 95% of the information from the questionnaires was missing. Thus, a total sample of 236 participants was included in the study. Socio-demographics and medical characteristics of the study participants are summarized in Table 4.

Questionnaires were administered by the recruited physicians during medical consultation or by their assistants in the waiting room. Patients in Switzerland were allowed to take the questionnaire home and send it back later with a provided return enveloped; patients recruited in Italy were invited to complete the questionnaire on the site, and return it to the doctor (to avoid losses while shipped from Italy to Switzerland). Responses to the questionnaire were anonymous.

The original questionnaire was drafted in English, and it was later translated into Italian. It was self-reported, that is; patients were asked to fill it out by themselves. The questionnaire was delivered in paper-pencil format for the majority of the participants, with an exception of 30 cases where the questionnaire was provided in an online version by one of the physicians or by the researcher, as a way of reaching these patients. Along with the questionnaire instructions on how to fill it out, patient informed consent, general information about the project, funding sources and approval of the ethics committee (i.e. Comitato Etico Cantolane FN132445.Rif.CE2453) were provided.

Measures

All variables except the socio-demographics items, asthma knowledge, and the judgment skills tool were measured by a 5-point Likert scale from Strongly Agree (5) to Strongly Disagree (1). Appendix III shows all the items included in the questionnaire and the used scales. *Communicative and critical health literacy* (Ishikawa et al., 2008): This was measured by five items assessing participant's skills in obtaining, evaluating, and using health information, e.g. "I can understand and communicate the obtained information." *Judgment skills*: This is a scenario-based tool composed of 11 situations and four response options each (i.e. ordered randomly). The scenarios address the topics of exercise, doctor-patient communication, information seeking, triggers control, symptoms recognition, and medicine usage. e.g. a scenario describing a situation with a person experiencing asthma symptoms for several days, and the response options presenting possible 'means' to choose from as a response to this situation, such as calling the doctor to discuss the symptoms. Respondents were asked to select the best response according to the described situation. In a prior study the adequacy of the response options for all scenarios was evaluated by a panel of experts in lung diseases (Moreno Londoño & Schulz, 2014). Thus, after a 3-round Delphi study all responses were classified per scenario from the most adequate (4) through the least adequate (1) response according to the situations described in the scenarios from the medical perspective. From this classification, a sum scale of all 11 scenarios with four response options each resulted in a minimum score of 11 and a maximum score of 44. Higher values represent more adequate judgment skills. *Asthma knowledge* (Kritikos et al., 2005): This was used as a control variable and consisted of a scale composed of twelve *true* and *false* items on asthma management and on asthma medication based on current guidelines, e.g. you can become addicted to asthma medications if you use them all the time. One item from the original version of the scale was not included, since it was addressed to parents of asthmatic children. *Psychological empowerment* (Spreitzer, 1995): This measured the in-

trinsic motivational process of patients in four dimensions. These are as follows: (a) *Meaning*: patients' value given to the self-management of the disease e.g. the self-management of my asthma is very important to me; (b) *Competence*: patients' perception of their own abilities to carry out self-management activities, e.g. "I am confident in my ability to self-manage my asthma;" (c) *Self-determination*: patients' perception of autonomy of having control and choice in the self-management of asthma, e.g. "I have the choice to decide on how to deal with my asthma"; and (d) *Impact*: patients' perception of influencing the self-management outcomes, e.g., "I have a great deal of control over my asthma." *Outcome measures*: six items addressed asthma self-management behaviors on medication use, avoidance of triggers, regular visits to the doctor, and doctors' consultations when asthma problems arise, e.g., "I take my control medicine as indicated by my doctor." The last section contained demographic information and medical history including year of birth, educational attainment, gender, and years suffering from asthma.

Statistical analysis

Statistical analyses were performed on data obtained from 236 asthma patients. Descriptive statistics using SPSS version 19 were carried out to characterize the study population and conduct reliability analysis of the scales used. SPSS AMOS program version 19 was used to run confirmatory factor analyses for each of the constructs in the model and to carry out structural equation modeling (SEM) analysis to study the relationships among all the variables belonging to the health empowerment model and to test the theoretical proposition on the collected data. Although other studies in the past have used the HEM, these did not include the *judgment skills* construct. Therefore, exploratory statistical analyses were carried out to identify the best fit of the model. Results from these analyses led to the deletion of four scenarios (i.e. Sc. 1, 5, 10, 13) (Appendix III) due to their low loadings ($\leq .20$), meaning that they did not contribute enough to the measure of judgment skills.

Results

Preliminary analysis

Preliminary analysis comprised examination of the data for outliers, missing values, and measures of skewness and kurtosis. Absolute values higher than three standard deviations from the mean were considered outliers at the univariate level. As only a few outlier cases were detected, they were included for the primary analysis. Moreover, a multivariate outlier analysis was carried out using model based and non-model based methods. Model based outliers were examined using limited information regression analysis for each of the linear equations according to the path model tested. An outlier was defined as a case with an absolute standardized dfBeta coefficient larger than 1.0. Based on these criteria no outliers were found in the sample data. Non-model based outliers were examined using leverage scores. The mean leverage score was 0.06, and outliers were defined as anyone having leverage score four times the value of the mean (Jaccard & Turrisi, 2003). No outliers were identified using this criterion. Furthermore, to evaluate if data was missing at random each variable was converted into a dummy variable (0 = missing value, 1= non missing value) and then correlated with age and education. Significant correlations indicated that the missing responses in the *judgment skills* items were not missing at random and were associated with both age and level of education. Missing data analyses revealed less than 10% missing values for each item, which is an acceptable range for the analysis without pursuing imputation or deletion of observations. Evaluation at univariate level of skewness and kurtosis revealed kurtosis problems in two items belonging to the *meaning* variable. Furthermore, a post-hoc power analysis using a limited information approach (Jaccard & Wan, 1996) was conducted to obtain a rough estimation of the statistical power. The maximum number of predictors for a linear equation was six. A conservative square multiple correlation of 0.15, a 0.05 alpha level, and two-tailed test were assumed. The sample sizes of 236 yielded power of

0.99 for a linear model with six indicators, which is statistically adequate power for the planned analysis.

A metric invariance analysis test was conducted to compare the responses of Italian versus non-Italian participants to assess whether the populations were significantly different on model structure. No significant differences were found ($\chi^2=21.43$, $df=23$, $p\text{-value}=0.56$). Therefore, the study sample was analyzed as one population.

Sample Characteristics

The study population was similarly distributed by gender with 53% females surpassing the males (46%). The mean age of participants was 43 years old. The majority of them had an educational attainment at either the apprenticeship (41%) or university level (30%). The average of years suffering from asthma was 20 with 41% suffering from intermittent asthma (i.e. symptoms that come and go) and 54% from persistent asthma (i.e. daily basis symptoms). Furthermore, 77% of the patients were using asthma medicines at the time of the survey, and 80% of the total participants were non-smokers. Participants' characteristics are shown in Table 4.

Table 4 . Demographic characteristics of patients

	n	%	Mean	SD
Gender				
Male	108	46		
Female	125	53		
Age (years)			43	17.7
Educational attainment				
None	1	0.4		
Elementary school/ Secondary school	53	22		
High school/apprenticeship	98	41		
University	70	30		
Other school	5	2.1		
Patient recruitment				
Italy (bordering cities)	140	59		
Switzerland (Italian-speaking region)	87	37		
Years suffering from asthma			20	14.7

Model testing

The proposed Health Empowerment Model was tested using Structural Equation Modeling (SEM). A correlation matrix was calculated using pairwise deletion to perform all the analyses on SEM. The use of this matrix avoided any possible problem of the missing data (<10%), since all the calculations were based on the correlation rather than the raw data.

The three predictors, *judgment skills*, *communicative and critical health literacy*, and *empowerment* were examined independently via confirmatory factor analysis (CFA). Items with acceptable item loading ($\geq .40$) were kept for the analysis of the entire model. Moreover, reliability analysis (Cronbach's alpha) was carried out to determine the reliability of the items within each of the predictors. There were reasonable

reliability values ranging from 0.67 to 0.86. Descriptive statistics of all indicators included in the model are shown in Table 5.

Good global fit indices for the final model were achieved after correlating several disturbance indices as suggested by the analysis (Appendix IV). These indicate that the correlated indices measured something in common other than the constructs represented in the model. These correlations were somehow expected due to the nature of these constructs as they measure values, beliefs, and perceptions that are normally consistent within the person. Another possible explanation for these disturbance indices concerns to

Table 5. Descriptive statistics of indicators in the Model

		Number of items	Range	M	SD	Skewness	Kurtosis	Cronbach's Alpha
Factors	Indicators							
Health Literacy								
	Critical & Comm. Health Literacy	5	1-5	3.72	0.84	-0.52	-0.02	0.84
Judgment skills	Scenarios	7	1-4	3.00	0.13	-2.0	2.47	0.67
Psychological Empowerment								
	Meaning	3	1-5	4.44	0.67	-1.42	2.80	0.86
	Competence	3	1-5	3.99	0.78	-0.53	-0.45	0.75
	Self-determination	3	1-5	3.58	0.96	-0.20	-0.74	0.78
	Impact	3	1-5	3.69	0.90	-0.44	-0.24	0.84
Asthma Management								
	Self-management	6	1-5	4.12	0.78	-1.18	1.49	0.78

unanalyzed associations that can be due to measurement methods (i.e. self-report scales that are prone to deliver same response trends). Generally, the factor loadings of the items within each construct were statistically significant and high, indicating an adequate measurement of the construct itself. These factor loadings ranged from .43 to 1.35 (Appendix V). The final model controlled for *asthma knowledge, education, years suffering from asthma*, and *age* as suggested by other authors (Berkman et al., 2011).

Table 6 shows the results of the structural analysis for the final model. Overall, the HEM components *judgment skills, communicative and critical health Literacy*, and *empowerment* explained 38% of the variance of self-management (Figure 7). Furthermore, two out of three hypotheses were confirmed. Hypothesis 1 and 3 were confirmed, thus, judgment skills and empowerment are positive and significant predictors of self-management (Table 7). For one unit increase in judgment skills and empowerment, the self-management practices of medicine use, trigger avoidance, timely prescription refill, and doctors' consultation are predicted to increase on average by 2.06 units, and 0.31 units respectively. Hypothesis 2 was not confirmed, health literacy was a significant negative predictor for self-management. For one unit increase in health literacy the self-management practices of medication use, trigger avoidance and doctors' consultation are predicted to decrease on average by -0.27 units.

Empowerment, judgment skills, and communicative and critical health literacy, are considered in the final model as independent factors influencing self-management. A preliminary model was tested using judgment skills and communicative and critical health literacy together as part of the same construct. However, results from the model failed to show them as part of the same construct, indicating that both were measuring two different things and that there were not underlying communalities. This is not surprising as communicative and critical health literacy focuses on patients' perception of seeking and using health information, whereas judgment skills focus on people's abilities to identify the appropriate means to carry out an adequate self-management. However, future studies should consider developing a measure for declarative and procedural knowledge that go in line with the topics presented in the judgment skills, thus the construct of health literacy can be measured in the model by the three elements proposed in the theoretical model (i.e. declarative and procedural knowledge, and judgment skills), and not as independent constructs as it was the case for the present study.

Table 6. Model fit for the Health Empowerment Model using SEM and for the single constructs using CFA

		SRMR	CFI	Chi ² /df	P-level	RMSEA	P-value of close fit	*AIC	*BCC	*BIC	*CAIC
Structural Model											
	HEM	0.05	1.00	0.92	0.89	0.00	1.00	657.20	707.62	1100.89	1232.89
CFA single constructs											
	Judgment skills	0.03	1.00	0.91	0.53	0.00	0.84	45.05	46.46	105.55	123.55
	Empowerment	0.04	0.99	1.50	0.02	0.05	0.51	136.07	141.04	263.80	301.80
	Health Literacy	0.01	1.00	0.47	0.70	0.00	0.83	25.41	26.11	65.75	77.75
	Self-management	0.02	1.00	0.82	0.51	0.00	0.73	25.27	25.91	62.25	73.25
SRMR:		range (0-1), criterion (≤ 0.05)									
CFI:		range (0-1), criterion (≥ 0.90)									
Chi ² /df		range (0-open), criterion ($\geq 1 \times \leq 3$)									
P-level:		range (0-1), criterion (≤ 0.05)									
RMSEA:		range (0-1), criterion (≤ 0.05)									
P-value of close fit:		range (0-1), criterion (≥ 0.05)									
AIC range:		(not defined), criterion (default model \leq saturated model)									
BCC range:		(not defined), criterion (default model \leq saturated model)									
BIC range:		(not defined), criterion (default model \leq saturated model)									
CAIC range:		(not defined), criterion (default model \leq saturated model)									

*This values are smaller than the values in the saturated model.

Table 7. HEM Factors influencing self-management

Constructs	B	95% CI	b
Judgment Skills to Self-management	2.06**	1.03 to 3.08	0.36
Health Literacy to Self-management	-0.27*	-0.51 to -0.03	-0.24
Empowerment to Self-management	0.31**	0.14 to -0.49	0.39

Note: ** $p < 0.001$ (two-tailed), * $p < 0.05$ (two-tailed); B = unstandardized coefficient, b = standardized coefficient, CI = confidence interval.

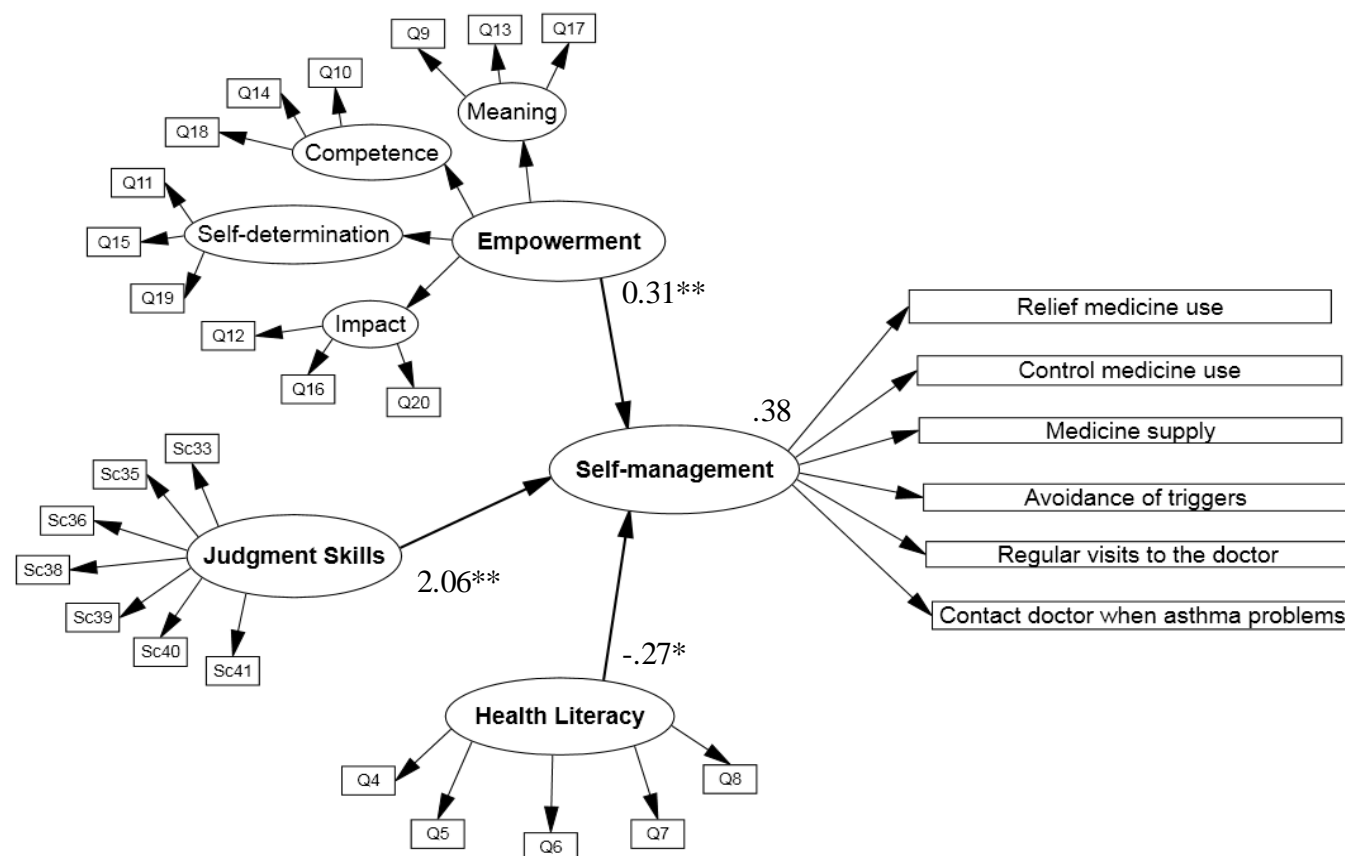


Figure 7. The Health Empowerment Model constructs and their path estimates to self-management.

Discussion & Conclusion

The present study used the health empowerment model to look into the influence of communicative and critical health literacy, judgment skills, and empowerment on six asthma self-management practices including medicine use, triggers avoidance, and doctors' consultation. It was hypothesized that the higher the health literacy, the judgment skills, and the empowerment the better the patient's self-management practices. Findings from this study show that judgment skills and empowerment affect these practices significantly and positively. Thus, the higher the patients' judgment skills and empowerment the better their medication use, their asthma trigger control, their timely prescription refill, and their compliance with doctors' consultations and appointments. Furthermore, communicative and critical health literacy affected these self-management practices significantly negatively, indicating the higher the patients' health literacy the lower their compliance with medication, their trigger control, prescription refill, and their doctors' consultations.

Judgment skills refer to individuals' abilities to identify the necessary means to attain good health as one of their goals (Rubinelli et al., 2009). In the scenario-based measure, these means include recognizing own health competences and the limits of it, thus turning to healthcare professionals when needed; appraising health information critically; engaging in an active communication with healthcare professionals through asking questions, and recognizing barriers that prevent patients to attain healthy behaviors. These skills reflect knowledge and expertise of individuals applied to the health care context (Schulz & Nakamoto, 2013). According to the finding of this study higher abilities entailing judgment skills may play a role in better self-management.

Several studies have reported that the replacement of a paternalistic health care perspective by a more patient-centered approach had positive results on health outcomes (Roter et al., 1997; Wanzer et al., 2004; Sewitch et al., 2003). This approach has also been reported as successful within the context of asthma resulting in

better asthma outcomes (Armour et al., 2007). The patient-centered approach considers the patients' preferences, needs, and values (CQHCA, 2001). This is of particular importance for chronic patients (Inzucchi et al., 2012.) as they are imposed with a great deal of responsibilities regarding self-management. Furthermore, this approach also considers individuals as autonomous patients able to participate in the decision-making process, and to engage in a partnership with their doctors, asking questions and contributing actively to their own care. Having adequate judgment skills will elicit a more effective engagement in their own self-care, as patients with these skills recognize partnership with doctors as a mean to attain good health; acknowledge their active role in their own self-care by asking questions; evaluate health information and recognize how they can contribute to their self-care, and, at the same time, know when health care professionals are needed. Several studies have shown that if there is a good partnership between doctor and patient, an increase in adherence to treatment, recall, and understanding of medical information follows (Chapman et al., 2000).

Although the conceptualization and operationalization of empowerment within the model comes from the context of organizational research (Spreitzer, 1995) it has been successfully used in the health context (Diviani et al., 2012; Camerini, 2012). Empowerment, considered as an intrinsic motivation of the individual, was found to have a positive and significant effect on self-management practices. This implies that patients, who ascribe a positive meaning to self-managing their condition, perceive themselves as competent to carry out self-management tasks. Those who also perceive that they can influence asthma outcomes through self-management will be motivated to use medicine as indicated by their doctors; avoid known triggers of their asthma; refill timely medicine prescriptions; go regularly to their doctor, and consult their physician when experiencing problems with their asthma. These findings support the crucial role of empowerment as an intrinsic motivator that enables patients to play an active role in their own health care. Associations between empowerment and appropriate disease management, improved health behaviors (Tsai &

Hung, 2004; Lorig et al., 2003; Lorig et al., 2001; Roberts, 1999), and increased satisfaction with doctor-patient communication (Holden et al., 2004; Lorig et al., 2003; Lorig et al., 2001; Endicott et al., 2003) have been reported extensively.

The detrimental effect of inadequate health literacy on individuals' health outcomes and behaviors, as well as on the economic burden on healthcare systems and societies is well documented (D'Eath et al., 2012). In the context of asthma self-management, earlier studies recognized health literacy as facilitator to learn about triggers avoidance, medication use, and monitoring of symptoms (Mancuso & Rincon, 2006), which in turns leads to an effective asthma self-management (Gazmararian et al., 2003; Williams et al., 1998a). Nonetheless, this study found that communicative and critical health literacy affected the self-manage practices of this study population significantly negatively. Several explanations can be given for this. One is that health literacy in asthma settings has generally been assessed using either the TOFHLA (e.g. Mancuso & Rincon, 2006) or REALM (e.g. Williams et al., 1998b), both focusing on reading skills, whereas this study used a tool that measured communicative and critical health literacy (Ishikawa et al., 2008). The items of this tool focused on individuals' perceptions regarding their abilities to search, select, judge and understand health information from different sources. These tools are measuring different things, obviously. It may, moreover, be that persons perceived themselves skillful concerning the abilities described in the screening questions while in fact they were not, creating the negative effect. Furthermore, studies exploring health literacy influences in asthma self-management have generally assessed emergency departments use (Hanania et al., 1997; Dales et al., 1995), number of hospitalizations (Gibson et al., 2009), and Metered-dose inhaler (MDI) technique (Williams et al., 1998a) as outcomes. In contrast, this study used different, but equally important aspects of the self-management of asthma as outcomes (GINA, 2012). This was done because some of the commonly used outcomes did not apply to the context in which this study was conducted. This is true for instance for the use of emergency departments, which unlike in the US it is not such a common practice for asthma pa-

tients of the study region to use as a first resource the Emergency Room, instead they call the doctor.

Other explanation for health literacy to exert negative influence on self-management is that in fact people with higher competencies will rely less on medical opinions, thus reducing their medical consultations, as well their medication use. Different studies highlight the latent shift on the doctor-patient relationship due to the use of the internet as a source of health information (Wald et al., 2007). Some of the most common health-related internet searches include information seeking on how to manage one's own health care independently (Wald et al., 2007), to self-diagnose (McMullan, 2006), to respond to questions regarding minor illnesses (Bouwman et al., 2010), to decide whether one needs medical help (McMullan, 2006), and to share health problems and treatments (Torrente et al, 2010). Furthermore, other studies suggest that patients may also relay on laypersons and semiprofessional sources when seeking health-related information (Manfredi et al., 1993). Thus, it may be that for these particular self-management practices health literate patients are more risk taking since they may rely on different sources of information rather than healthcare professionals, to the detriment of the self-management practices.

Another possible explanation is that either health literacy or empowerment has a moderator or mediator role one over the other. When corresponding models are tested, the observed negative effect of communicative and critical health literacy and self-management may disappear. This alternative hypothesis implies further analysis that fall out of the scope of present study, and that should be considered for future work. Model generating analysis should be used for this purpose, where the elements of the proposed theoretical model (Schulz & Nakamoto, 2013) would assume different roles such as moderator or mediator's factors.

Associations between health literacy and empowerment and between judgment skills and empowerment could not be established in the conducted analyses analysis due to the nature of the measurements. The construct of empowerment is a second order factor, meaning that the construct itself is measured by other four sub-

factors (i.e. meaning, competence, self-determination, impact), while health literacy and judgment skills were first order factors measured directly by the items. These differences in factor level impeded to test a possible correlation with the empowerment construct.

The findings of this study should be interpreted in the context of its limitations. This study was conducted in the Italian-speaking region of Switzerland and bordering cities of Italy. Therefore, results may not be generalized to other settings. Furthermore, participants' educational attainment was in general high. Thus, people who accepted to participate and thoroughly fill in the questionnaire might have had a higher level of education than the ones who declined to participate. As missing data was significantly associated with age and education, this might imply that the design and type of questions on the questionnaire, particularly the scenarios section where the majority of the missing values were reported, might not be adequate for people with low education. Furthermore, the survey was self-reported with no objective measures of medicine use which may introduce some bias regarding the self-reported self-management practices. However, the survey was anonymous to raise trust and openness among the participants.

Several questions remain open for future research as they were out of the scope of this study. It will be interesting to categorize individuals according to their health literacy, judgment skills, and empowerment levels, and also to form groups with the combinations of these elements, and explore how asthma self-management is explained according to these categories. It would be useful to include an objective measurement such as lung function (FEV1) to obtain stronger results on the effect of the health empowerment model elements on asthma self-management. It would be also interesting to replicate this study in the context of other chronic diseases where self-management is a key for effective disease control.

In summary, results of this study partially confirm the assumption of the theoretical model proposed by the Health Empowerment Model (Schulz & Nakamoto, 2013). Thus, it is confirmed that both empowerment and judgment skills do play a

positive role for self-management practices. Empowerment as a volitional component referring to the internal motivations of patients to engage in self-management practices allows patients to carry out self-management tasks more effectively; and judgment skills as a more knowledge-related component allows patients to understand the importance of carrying self-management closer to what has been discussed with the healthcare professionals.

These findings support the use of empowerment and judgment skills as key elements for patient education programs concerning enhancement of asthma self-management competencies. Thus, empowerment should be treated as the motivator element for patients to engage in self-management activities, and judgment skills as a more knowledge-related element that enables better self-management practices. Furthermore, the judgment skills tool can be also be considered as a contribution to the context of asthma self-management assessment as few tools have been specifically designed to measure the extent to which self-management behaviors are used by individuals (Rand et al., 2012). Likewise, this study recommends developing different strategies targeted to individuals with adequate health literacy to reinforce their partnership with doctors rather than depart from their medical expertise.

CHAPTER V

General Conclusion

Conclusion

Health literacy has been recognized as a strong determinant of health outcomes and health behaviors (WHO, 2013). This has generally been defined as the individual's abilities to "obtain, process, and understand basic health information and services needed to make appropriate health decisions" (Ratzan & Parker, 2000: p. ix). While this definition implies individuals' abilities that go beyond reading, writing, and numeracy skills, it has been continuously and exclusively assessed using tests that address these functional abilities, reflecting a lack of more comprehensive tools measuring other health literacy aspects. Judgment skills were proposed within the Health Empowerment Model as a more advanced dimension of health literacy (Schulz & Nakamoto, 2013). These skills refer to the individuals' abilities to recognize the necessary means to attain good health as one of the individuals' goals. These means one must be able to identify one's own health competencies and the limits of these, and the acknowledgement of the importance of establishing a partnership with healthcare providers (Rubinelli et al., 2009). Owing to the lack of comprehensive tools to measure more advanced health literacy skills, the present dissertation aimed to contribute to this field by developing and operationalizing an instrument addressed to assess judgment skills, and to explore their role in the context of asthma self-management.

This dissertation is composed of three interconnected studies. The first one was carried out to develop and validate a judgment skill tool for the context of asthma self-management; the second was developed to test the performance of the tool on 80 asthma patients; and the third was conducted to assess the role of judgment skills, empowerment, and communicative and critical literacy in asthma self-management. The final outcomes of these studies resulted in a seven scenario-based judgment skills tool for the field of asthma self-management validated by a panel of 12 experts in the field of lung diseases; piloted within 80 asthma patients, and finally administered to an independent sample of 236 asthma patients in the Italian-speaking

region of Switzerland and bordering cities of Italy. Moreover, the role of judgment skills was measured. Findings confirmed that when patients have adequate judgment skills, they comply better with their control and rescue medicines; they refill their medicine prescriptions in a timely fashion; they try to avoid known asthma triggers; they visit their doctor regularly; and consult their doctors when asthma-related problems arise. Furthermore, psychological empowerment was found to have a positive effect on asthma self-management practices indicating that patients who perceive themselves as empowered (i.e. intrinsically motivated) will engage more adequately in the aforementioned self-management practices. However, an unexpected research finding that resulted from this study was that there was an inverse correlation. Specifically, high levels of critical and communicative health literacy seem to result in poor asthma self-management practices. This indicated that the higher the health literacy level of the individual, the lower his or her compliance with taking asthma medications, lower attention to avoid asthma triggers and poor adherence to doctors' consultations.

Contribution to the field of health literacy and asthma self-management

The judgment skills tool was developed in the field of asthma self-management mainly for three reasons. The first is that health literate patients have previously been proven to better manage their chronic conditions (Berkman et al., 2004); and to more adequately carry out inherent management tasks (Nutbeam, 2008). The second is that a strong link between adequate health literacy and effective asthma self-management has been extensively reported (Rosas-Salazar, 2012; Thai & George, 2010; Mancuso & Rincon, 2006; Paasche-Orlow et al., 2005; Gazmararian et al., 2003; Clark & Nothwehr, 1997), and the third is the importance of self-managing asthma as it is one of the most common chronic diseases in the world (GINA, 2012) with 235 million people sufferers (WHO, 2014). This figure is expected to increase even further over the next 15 years (Bousquet et al., 2007). Therefore, asthma is an ideal health condition to develop the judgment skills tool as self-

management has a great impact on this condition, and this at the same time has been proven to enhance when health literacy is adequate. Furthermore, in Switzerland, where most of this study was made, six percent of the population suffers from asthma, and only 16% of them have well-controlled asthma (e.g. minimal day and night symptoms) whereas 50% has an insufficient control, partly due to poor asthma-self-management practices (Leuppi et al., 2006). Similar figures are found in Italy (Cazzola et al., 2011), where another part of the recruitment was conducted for the last study. Thus, as asthma control has been reported to be insufficient in Switzerland and Italy, these settings were appropriate for patient recruitment and to explore how judgment skills affect the self-management of this condition.

The contribution made to the field by the first article resides in the development and operationalization of a judgment skills tool to measure a more advanced dimension of health literacy. As stated earlier, this dimension was proposed theoretically within the health empowerment model (Schulz & Nakamoto, 2013) without being operationalized. The developed tool in collaboration with 12 experts in the field of lung diseases assures that the content and face validity of this tool is appropriate for the asthma self-management context. Similarly, the development of this tool in a scenario-based format is also an important contribution to the measurement of health literacy, as most other tools rely on reading, writing, numeracy abilities, or factual knowledge tests. As stated earlier the connection between knowing facts about a health condition and using them to change behavior has not yet been found (Becker, 1990). Therefore, the advantages of scenario-based tools over more conventional ones are that they recreate realistic situations, making subjects to respond by applying their knowledge and abilities. These types of tests have been successfully used and reported as good proxies of real-world performance (McDaniel et al., 2007; Weekley & Ployhart, 2006).

The second paper provided continuity to the evaluation of the developed judgment skill tool in the first study, and allowed a preliminary exploration on how these judgment skills may affect the self-management practices of asthma patients.

Findings from this study resulted in a refinement of the tool and in an extension of patients' recruitment in bordering cities in Italy for the third study. Moreover, the association between judgment skills in asthma self-management was initially confirmed. Thus, from this preliminary approach, significant differences were found on the self-management practices between patients with Low vs. High judgment skills, indicating that patients having adequate judgment skills may have a more adequate self-management in general, revealing that indeed there is a connection between these practices and the explored abilities. These results were explored further and with robust analyses in the third study.

The third study contributed with the implementation of the judgment skills tool in a larger study with 236 asthma patients and by supporting the use of the Health Empowerment Model to have a better understanding of patients' health behaviors in the light of empowerment and health literacy elements. Findings from this study confirmed the key role of empowerment and judgment skills for asthma self-management practices. However, findings unexpectedly displayed negative effects of communicative and critical health literacy on self-management practices. This is opposite to what generally studies have reported in the past (Rosas-Salazar, 2012; Mancuso & Rincon, 2006; Paasche-Orlow et al., 2005; Gazmararian et al., 2003). Possible explanations for this is that health literacy in the asthma context has been exclusively assessed by the REALM and the TOFHLA (Thai & George, 2010), which tackle functional skills such as reading, writing and numeracy, something that is very different from what communicative and critical health literacy measures. The latter focuses on health information seeking, and the ability to understand and discuss this information with health care professionals. Another possible explanation is that people with higher competencies have higher self-reliance, thus reducing their medical consultations, as well their medication use. Different studies highlight the latent shift on the doctor-patient relationship due to the use of the internet as a source of health information (Wald et al., 2007). Nevertheless, due to the nature of the results contradicting what has been generally reported for health literacy in the asthma context,

this study suggests that further research should be done to investigate the definitive role of communicative and critical health literacy skills on different asthma self-management practices and in other chronic conditions to clearly establish their effect of self-management outcomes.

Limitations

Findings from this work need to be considered in the light of its limitations. The patient population used in this work was mainly Swiss-Italian and Italians, which may affect the generalizability of these findings. Thus, the influence of communicative and critical health literacy, judgment skills, and empowerment on self-management practices may be different in other populations. Therefore, their influence should be tested among different patient populations in other geographic areas to establish their general effect. Furthermore, participants generally were highly educated; this is because the educational level of the general population in Switzerland is high. Although all efforts were made to recruit a heterogeneous sample regardless of educational level, the ones who accepted may have achieved higher educational attainment. As shown in the results from the last study, missing responses were significantly associated with educational attainment and age. This may also point to the level of difficulty of the questionnaire, especially of the scenario-based tool, where more missing data was concentrated. This section comprised a considerable amount of reading, something that might have been underestimated when the tool was developed. Thus the use of this tool in populations with limited education might not be suitable.

Future research

Judgment skills are a new dimension proposed as part of health literacy. The present work was the first study in developing, operationalizing and exploring the effects of these within the patients' health context, showing its potential to explain self-management practices. Nevertheless, more research should be done regarding the

definition of judgment skills. These abilities were theoretically defined by Rubinelli et al., (2009) and later on included in the Health Empowerment Model (Schulz & Nakamoto, 2013). However, a deeper understanding of what these abilities entail is needed. It is assumed that individuals' experience with the health condition is the basis of judgment skills, as these experiences allow individuals to respond to different situations and life events that are faced during their self-care. However, this study was not able to confirm this assumption; during the pilot study the association between years living with asthma and judgment skills was not found. Then within the last study, a preliminary model was run to assess whether years living with the health condition affected judgment skills. This effect was not supported by the research. It is very important to identify and categorize the elements pertaining to this construct in order to advance in the efforts to improve judgment skills, theoretically and empirically.

Judgment skills were defined as part of more advanced health literacy skills (Schulz & Nakamoto, 2013). These in conjunction with declarative and procedural knowledge will capture the overall dimension of health literacy. The present work could not measure this theoretical assumption as there were no appropriate scales to measure declarative and procedural knowledge in line with the topics measured by the judgment skills. Therefore, judgment skills and health literacy were analyzed as independent constructs (i.e. as there were not underlying communalities). Future studies should test this theoretical assumption to claim that indeed judgment skills are part of health literacy. Furthermore, future work also should test the suggested four resulting groups based on the health literacy and empowerment level of patients as high literate - high empowered, low literate – high empowered, high literate - low empowered, low literate-low empowered and explore the effect of this interaction on health behaviors, as suggested by the Health Empowerment Model (Schulz & Nakamoto, 2013).

Although the use of a scenario-based test can give richer information about peoples' skills and abilities use, the amount of reading contained within the scenarios may be a limitation of this format. Therefore, the present study proposes that future research should explore other formats of the situational judgment tests including video clips. Using this type of format will help to overcome the burden of reading and create more realistic situations. Thus, scenarios can be easier to describe, and be more participant-friendly. This is something that at present does not necessarily involve extra cost or complicated procedures. The use of these types of formats has demonstrated high accuracy in describing the situations in other fields (Weekley & Ployhart, 2006). Moreover, the judgment skills tool presented in a scenario-based format has the potential to be used as educational material for patients where they can learn how to respond to common situations when self-managing their asthma. This is something that would be interesting to explore in future work.

Implications of the findings

Health literacy involves more content-specific skills and health-related knowledge that do not necessarily fit the educational level of the individual, nor his or her professional skills (Nutbeam, 2008; Mancuso 2009). Persons could be very literate in terms of general reading, and/or skillful in their jobs, but at the same time not adequately health literate regarding their specific health conditions (Gazmararian et al., 2003; Parker et al., 1995). This underscores the necessity for developing content-specific tools to assess the health literacy levels of individuals according to their health condition, as the knowledge and skills required vary. Consequently, the judgment skills tool developed in this study can contribute to this effort. This tool specifically addresses key topics regarding the self-management of asthma, having the advantage of assessing the abilities needed for this particular population, and thus, the benefits of translating findings from the use of this tool into strategies that directly tackle the needs of this population. Furthermore, the operationalizing of this tool contributes one step forward towards the measurement of more advanced health lit-

eracy dimensions. This is important since, as previously mentioned, the field of health literacy has been hindered by the lack of more comprehensive tools that measure skills beyond reading, writing and numeracy.

Additionally, the present work contributes in several ways to the context of asthma self-management. It has been noted that generally patient education focuses primarily on knowledge transmission (Becker, 1990) and at the same time it has been underscored that this type of education does not necessarily translate into adequate health behaviors (Bernard-Bonnin et al., 1995; Becker, 1990), or best practices regarding the self-management of the condition. Findings from this work confirmed the important role played by empowerment, and emphasized the potential of judgment skills for asthma self-management. As noted by the authors of the Health Empowerment Model, while health knowledge is crucial to competently engage in one's self-care, empowerment is equally important as it serves as the motor that drives the motivation in individuals so they want to engage in their own self-care (Schulz & Nakamoto, 2013). The former provides the knowledge while the latter provides the motivation to put this knowledge into practice. Therefore, these findings support and call for the design and implementation of patient educational programs where empowerment and judgment skills are addressed together with health-knowledge enhancement. Patients should be taught technical competencies related to the self-management of the conditions, and at the same time should be taught aspects addressing personal motivation, including setting own goals regarding the self-management of their condition. This would also include having the necessary means to achieve these goals, and the importance to develop a partnership with a healthcare provider. Moreover, it has been noted that there is a lack of instruments that specifically measure asthma self-management behaviors (Rand et al., 2012). Thus, the judgment skill tool represents a contribution for the context of asthma self-management as this tool rather than measure factual knowledge focus on how patients use knowledge and abilities.

This study concludes that judgment skills and empowerment are crucial elements for an appropriate asthma self-management, and that both should be considered, together with health knowledge enhancement, for the design and implementation of asthma patient education. Moreover, this study supports the use of the Health Empowerment Model to study health behaviors under the light of empowerment and health literacy elements and to design patient interventions addressed to enhance motivations and skills needed to identify own goals regarding the self-management of the disease and the means need to achieve them. Lastly, exploring further the potential of judgment skills and its measurement represents a promising new direction for health literacy research, especially in the context of chronic diseases.

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APPENDICES

Appendix I. Doctors' rankings of response options for the 19 scenarios

	Most Adequate	Rather Adequate	Rather Inadequate	Most Inadequate	ICC
Sc1. Exercise & rescue medicine	The patient would immediately use the medicine Round 3	The patient would continue exercising and would not use the medicine Round 2	The patient would finish exercising and later use the medicine Round 3	The patient would stop exercising and would consider stopping it indefinitely Round 2	0.93
Sc2. Exercise & medicine compliance	The patient would tell the instructor that he is experiencing symptoms and take his medicine at home Round 2	The patient would continue exercising with less vigor Round 3	The patient would stop exercising and go home to take the medicine Round 2	The patient would continue exercising and would not pay attention to symptoms Round 2	0.98
Sc3. Medicine use & public places	The patient would use his inhaler where he is	The patient would leave his friends and go to a more private place to use his inhaler	The patient would not use the inhaler,,believing the symptoms would disappear eventually	The patient would not know what to do	0.98
Sc4. Doctor's advice & control medicine	The patient would only follow his doctor's advice Round 2	The patient would consult with the doctor about using alternative medicine Round 2	The patient would ask the doctor for a different medicine Round 2	The patient would not consult with his doctor, and would make an appointment with somebody that treats asthma with alternative medicine Round 2	.98
Sc5. Doctor's advice & medicine side-effects	The patient would discuss it with his doctor and if he is convincing, the patient would use it Round 3	The patient would discuss an alternative with his doctor Round 2	The patient would discuss it with his doctor, but if the doctor insist that he not use the medicine Round 2	The patient would not use the medicine nor any other medicine Round 2	0.98
sc6. Information seeking on-line	The patient would dismiss the advice and simply follow the doctor's advice Round 1	The patient would consult with his doctor before following advice Round 2	The patient would follow the advice of this person if other person also supports such advice Round 1	The patient would follow the advice of this person without consulting with his doctor Round 2	0.99
Sc7. Information Seeking and side-effects	The patient would use the new medicine, but would discuss his concerns with the doctor Round 1	The patient would dismiss the information and would follow his doctor's advice Round 2	The patient would ask his doctor to prescribe the former medicine Round 3	The patient would be very concerned about the side-effects of the medicine; therefore he would not use it Round 2	0.98

Sc8. Trigger avoidance & smoking	The patient would stop smoking by himself Round 3	The patient would ask the doctor for an alternative to help him quit smoking Round 3	The patient would not be able to stop,, although he knows is the right thing to do Round 3	The patient would continue smoking Round 3	0.99
Sc9. Monitoring symptoms	The patient would use the Peak Flow Meter Round 3	The patient would ask the doctor for an alternative method to monitor symptoms Round 3	The patient would not use the Peak Flow Meter Round 3	The patient would not use the Peak Flow Meter and use more rescue medicine Round 3	0.99
Sc10. Trigger avoidance & Pet owning	The patient would follow his doctor's advice and would give away the cat Round 1	The patient would discuss an alternative solution with his doctor Round 2	The patient would increase the use of his rescue medicine in order to keep the cat Round 3	The patient would not give away the cat although he is convinced that it has nothing to do with his symptoms Round 2	0.98
Sc11. Written Asthma Action Plan use	The patient would ask his doctor again for directions on how to use it Round 1	The patient would ask friends and family for help on how to use it Round 3	The patient would be skeptical about the usefulness of it; thus, he would not use it Round 2	The patient would not ask again about how to use it Round 1	0.99
Sc12. Change of medicine	The patient would ask his doctor the reason for the change Round 2	The patient would use the new medicine and would seek information about it by himself Round 3	The patient would try the medicine and would wait to see how he reacts to it Round 3	The patient would tell his doctor about his preference for the former medicine Round 3	0.92
Sc13. Control and rescue medicine use	The patient would follow his doctor's advice using both the rescue and control medicine as indicated Round 1	The patient would only use his rescue medicine to alleviate symptoms Round 2	The patient would use neither the rescue nor control medicine if he is symptom-free Round 2	The patient would use the rescue medicine, and when he remembers, would use the control medicine Round 2	0.99
Sc14. Asthma symptoms & taking action	The patient would contact his doctor Round 2	The patient would control the symptoms by himself as indicated by the doctor; if this would not work, he would not contact the doctor Round 1	The patient would not know what to do Round 2	The patient would control the symptoms by himself as indicated by the doctor, if this would not work, he would contact the doctor Round 2	0.97
Sc15. Perception of asthma control	The patient would think these are not normal symptoms for somebody suffering from asthma; therefore he would say his asthma is not under control Round 2	The patient would think these are normal symptoms for somebody suffering from asthma, and he would increase his rescue medicine Round 2	The patient would think his asthma is under control, because when using his rescue medicine (>4 times a	The patient would think these are normal symptoms for somebody suffering from asthma; there-	0.99

			week) his symptoms disappear. Round 2	fore he would say his asthma is under control Round 3	
Sc16. Asthma symptoms recognition	The patient would make an appointment with his doctor, because his asthma is not controlled Round 1	The patient would think his asthma is under control, using his rescue medicine > 4 times a week Round 2	The patient would think that the increase of the rescue medicine would have nothing to do with not having the asthma under control Round 2	The patient would not consult his doctor because these symptoms are normal, and his asthma is controlled Round 2	0.98
Sc17. Trigger avoidance & Peak Flow Meter	The patient would find the time to see his doctor, to have reserved medication Round 2	The patient would only see his doctor if he starts experiencing symptoms Round 2	The patient would not find the time to see his doctor, is not necessary to have a reserve of the medication Round 2	The patient would think he not need medicine anymore, because he has not experienced symptoms lately Round 3	0.99
Sc18 Asthma symptoms & medicine use	The patient would go to the emergency room Round 2	The patient would wait for a couple of hours and if the symptoms do not disappear he would call his doctor Round 3	The patient would use his rescue medicine, and would not see the doctor Round 1	The patient would not use any medicine, and would think the symptoms would disappear Round 2	0.98
Sc19. Control medicine use	The patient would follow the doctor's advice, and use the control medicine Round 1	The patient would not follow the doctor's advice and not use the control medicine Round 2	The patient would not use the control medicine because he is afraid of the side-effects Round 2	The patient would not follow the doctor's advice, but he would use the medicine according to what he feels he needs it Round 2	0.98

Appendix II. Situation described in the 19 scenarios

Topic	Description of the 19 Scenarios
Exercise	Scenario 1. The doctor advises the patient to participate in sports. The patient accepts, and while doing it he starts experiencing some asthma symptoms. What would he do?
	Scenario 2. The doctor advises the patient to use the rescue medicine (e.g. Ventolin) before doing exercise. The patient forgets to use it. Thus while exercising he starts experiencing some asthma symptoms. What would he do?
Medicine usage	Scenario 3. The patient starts to experience some asthma symptoms in a public place. What would he do?
	Scenario 13. The doctor advises the patient to use the control medicine (e.g. Seretide) in a daily-basis regime, even during symptom-free periods, and to use the rescue medicine (e.g. Ventolin) only to alleviate symptoms. What would he do?
	Scenario 18. The patient has been experiencing strong and frequent asthma symptoms, which did not disappear even after the use of his rescue medicine (e.g. Ventolin). What would he do?
	Scenario 19. During the past months the patient has been symptom-free. However, his doctor advised him to continue using his control medicine (e.g. Seretide). What would he do?
Doctor-Patient Communication	Scenario 4. The doctor advises the patient to use a medicine that is cortisone-based. However, the patient feels reluctant to use it, since he has experienced several side effects in the past from using this component. Some friends recommend that instead use alternative medicine. What would he do?
	Scenario 5. The doctor advises the patient to use a medicine that is salbutamol-based (e.g. Ventolin). However, the patient feels reluctant to do this, because he knows some people who have experienced bad side-effects from the use of this medicine. What would he do?
	Scenario 14. The patient has followed all the directions given by the doctor, regarding the use of his medicine, and he knows what to do in case of experiencing symptoms. Now, he is experiencing strong and frequent asthma symptoms. What would he do?
	Scenario 11. The doctor has given the patient, some time ago, an Action Plan indicating how to use medicines, and what to do in case of symptoms, or an emergency. Now the patient is experiencing strong and frequent asthma symptoms. Therefore, he tries to use his action plan. However, he realizes that he does not remember how to use it. What would he do?
	Scenario 12. The doctor gives the patient an action plan, concerning how to use medicines, and what to do in case of symptoms. However, the patient did not fully understand how to use the action plan. What would he do?
	Scenario 17. The doctor advises the patient to make an appointment every six months to evaluate how he is responding to the therapy, and to renew his medicine prescription. However, eight months have passed and the patient (who has experienced only some mild symptoms) has not yet fixed the appointment with the doctor, and he is running out of his medicines. What would he do?
Information seeking	Scenario 6. The patient consults an online forum because he has been experiencing some side-effects due to the newly prescribed medicine by his doctor, and he wants to find out if somebody else has had a similar experience. A person from the forum advises him to change the frequency and the dosage of the medicine, which is totally opposite to what the doctor advised him. What would he do?
	Scenario 7. The patient enters an online forum to inquire about the newly prescribed medicine, and he finds some disconcerting information about its side-effects. What would he do?
Triggers avoidance	Scenario 8. The doctor advises the patient to quit smoking and to avoid any tobacco smoke inside the house, despite knowing that some family members that live with him also smoke. What would he do?
	Scenario 9. The doctor advises the patient to use a Peak-Flow-Meter to monitor his breathing patterns. What would he do?
	Scenario 10. The doctor finds out that the main asthma trigger for the patient is his cat. Therefore the doctor advises the patient to give up the cat. What would he do?

Symptoms
recognition

- Scenario 15.** The patient has been experiencing a lot of asthma symptoms lately. Therefore he has been using his rescue medicine more often (e.g. Ventolin). Now the patient is with his doctor, and he is asking the patient about his asthma symptoms. What would he do?
- Scenario 16.** The patient has returned from his vacation in the mountains, where he started to experience some asthma symptoms. Now he is back at home. However, his symptoms have not improved, in fact, they have gotten worse. What would he do?

Appendix III. Questionnaire Study III Health Empowerment (Except Scenarios)

Item. No.	Item	Scale
Communicative & critical health literacy		Strongly agree (5) Strongly disagree (1)
4.	I can collect health related information from various sources	
5.	I can extract the information I want	
6.	I can understand and communicate the obtained information	
7.	I can interpret and judge the credibility of the information	
8.	I can make decisions based on the information, and relate it to my situation and health issues	
Empowerment		Strongly disagree (1) Strongly agree (5)
Meaning	9. Self-managing my asthma is very important to me	
	13. The actions that I carry out to take care of my asthma are meaningful to me	
	17. Actively aking care of my asthma is very meaningful to me	
competence	10. I am confident about my ability to self-manage my asthma	
	14. I am secure about my abilities to self-manage my asthma	
	18. I am prepared to do the activities necessary to self-manage my asthma	
Self-determination	11. I have significant autonomy in determining how I self-manage my asthma	
	15. I can decide on my own how to self-manage my asthma	
	19. I have considerable opportunity for independence and freedom in how I self-manage my asthma	
Impact	12. My control over the management of my asthma is satis factory	
	16. I have a great deal of control over the management of my asthma	
	20. I have considerable control over the management of my asthma	
Asthma self-management questions		Always (5) Never (1)
48	I tried to avoid things that I know may trigger my asthma	
49	I take my control medicine as indicated by my doctor	
50	I take my rescue medicine as indicated by my doctor	
51	I try to have a supply of my asthma medicines, before I finish the ones that I am currently using	
52	I plan the frequency of my doctor visits according to his/her suggestions	
53	I go to the doctor if I am experiencing problems with my asthma	
Asthma knowledge		True (1) or False (0)
21.	You can become addicted to asthma medications if you use them all the time (F).	
22.	An asthma action plan can prevent hospitalizations due to asthma (T).	

23. When you know that you are going to be exposed to something that triggers asthma, you should take the recommended medication just before exposure. (T).
24. When you know that you are going to be exposed to something that triggers your asthma, you should wait until you develop symptoms before taking medication. (F)
25. Side effects are less likely with inhaled medications than with tablets. (T)
26. With preventative medications, it does not matter if some doses are missed or if you go on and off them. (F)
27. If you get a cold or flu, you should increase your asthma medications. (T)
28. Some medications can trigger asthma attacks. (T)
29. You should use "preventer medication" when you have an asthma attack. (F)
30. Going from a cold to hot environment can trigger asthma, but going from a hot to cold environment does not trigger asthma. (F)
31. Blue puffer (Ventolin), Brown puffer (Flixotide) and Green puffer (Serevent) are called "preventer medications", so they should be used everyday although you are well. (F).

Demographics

- | | | | |
|-----|--|-----|----------------------|
| 54. | How old were you when your
were diagnosed with asthma | 59. | Gender |
| 55. | Type of asthma | 60. | Year of Birth |
| 56. | Smoke | 61. | Where are you from? |
| | Are you currently using asthma
medication | 62. | Last degree obtained |
| 57. | | 63. | Where do you live? |
| | | | |
-

Appendix IV. Disturbance terms within the Health Empowerment Model

Disturbance Terms	Estimate	Disturbance Terms	Estimate
e4 - e18	0.13	e51 - e17	0.26
e4 - e5	0.55	e52 - e15	-0.24
e4 - e6	0.25	e53 - e62	0.15
e5 - Age	0.21	e59 - e14	-0.28
e5 - e52	0.18	e14 - Education	-0.17
e5 - e6	0.43	e21 - Age	0.19
e7 - e10	-0.24	e35 - Years Suff. Asth.	-0.14
e8 - e12	0.21	e39 - Education	-0.22
e8 - e14	-0.18	e17- Age	0.12
e8 - e51	0.17	e19 - Knowledge	-0.19
e10 - e12	0.24	e50 - Age	-0.19
e10 - e55	-0.19	e55-Knowledge	0.26
e11 - e52	0.15	e56 - Empowerment	0.61
e13 - e55	-0.2	e61 -Knowledge	0.17
e15 - e16	0.25	e7 - Knowledge	-0.22
e16 - e57	-0.23	e7 - Year Suff. Asth.	-0.2
e18 - e21	0.36	Knowledge - Age	-0.01
e18 - e57	0.21	Knowledge - Years Suff Asth.	0.1
e18 - e61	0.39	Education - Age	-0.22
e19 - e10	-0.24	Education - Knowledge	0.06
e19 - e15	0.25	Education - Years Suff. Asth	-0.1
e20 - e21	0.25	Year Suff Asth. - Age	0.35
e20 - e55	0.23		
e21- e57	0.31		
e21- e60	0.43		
e21- e61	0.46		
e35 - e39	0.25		
e39 - e62	0.17		
e15 - e20	-0.18		
e15 - e62	-0.23		
e19 - e40	-0.16		
e49 - e41	-0.22		
e49 - e51	-0.33		
e50 - e61	-0.19		
e51 - e21	0.07		

*Look at AppendixIII for the items corresponding to these numbers

Appendix V. Results summary of the final model

	B	95% CI	b
Empowerment to Meaning	0.18**	0.08 to 0.29	0.26
Empowerment to Competence	0.72**	0.61 to 0.83	0.93
Empowerment to Self-determination	0.91**	0.79 to 1.03	1.06
Empowerment to Impact	0.79**	0.66 to 0.92	0.86
Meaning to Q9	0.79**	0.67 to 0.92	0.76
Meaning to Q13	0.94**	0.81 to 1.07	0.84
Meaning to Q17	Marker indicator		0.86
Competence to Q10	1.06**	0.91 to 1.22	0.82
Competence to Q14	Marker indicator		0.81
Competence to Q18	0.64**	0.47 to 2.60	0.51
Self-determination to Q19	0.86**	0.70 to 1.02	0.66
Self-determination to Q15	0.96**	0.78 to 1.14	0.65
Self-determination to Q11	Marker indicator		0.81
Impact to Q20	0.87**	0.73 to 1.00	0.77
Impact to Q16	Marker indicator		0.82
Impact to Q12	0.91**	0.77 to 1.04	0.81
Self-management to Use of Control Medicine	1.03**	0.79 to 1.28	0.68
Self-management to Use of Rescue Medicine	0.77**	0.57 to 0.97	0.62
Self-management to Medicine Supply	0.86**	0.66 to 1.07	0.69
Self-management to Regular Visits to doc.	Marker indicator		0.67
Self-management to Visit doc. if asthma problems	0.89**	0.70 to 1.09	0.69
Judgment to Sc19	0.71**	0.39 to 1.02	0.41
Judgment to Sc17	0.65**	0.44 to 0.86	0.64
Judgment to Sc15	0.95**	0.50 to 1.41	0.37
Judgment to Sc14	0.47**	0.27 to 0.66	0.35
Judgment to Sc9	0.77**	0.51 to 1.03	0.60
Judgment to Sc7	Marker indicator		0.53
Judgment to Sc3	0.43**	0.22 to 0.63	0.37
Health Literacy to Gather Health Info (Q4)	0.70**	0.52 to 0.88	0.56
Health Literacy to Select health Info (Q5)	0.88**	0.72 to 1.05	0.63
Health Literacy to Communicate Health Info (Q6)	Marker indicator		0.77
Health Literacy to Assess Health Info (Q7)	1.35**	1.09 to 1.62	0.81
Health Literacy to Make Decisions (Q8)	1.23**	0.97 to 1.49	0.69

Note: ** $p < 0.001$ (two-tailed), * $p < 0.05$ (two-tailed); *B* = unstandardized coefficient, *b* = standardized coefficient, *CI* = confidence interval.

Marker indicator: fixed at 1.

Look in Appendix III for the items corresponding to these numbers